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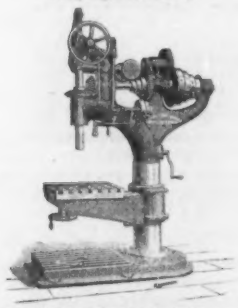

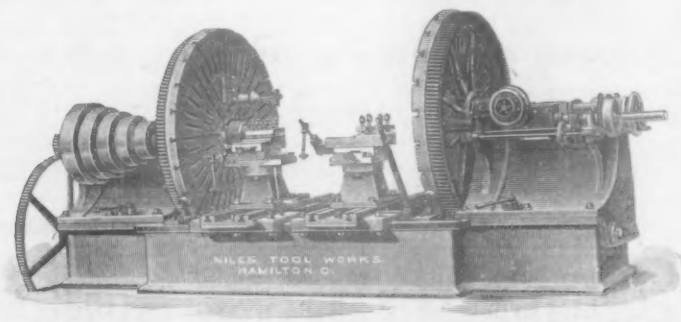

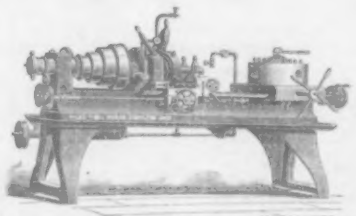

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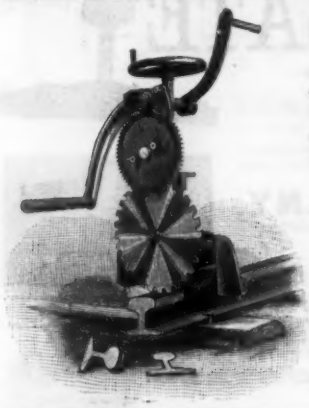

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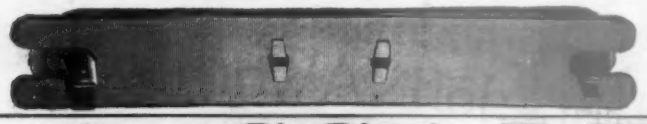

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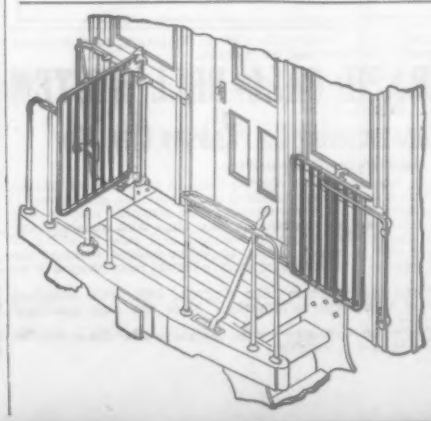

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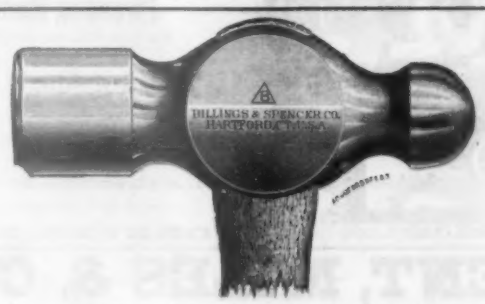

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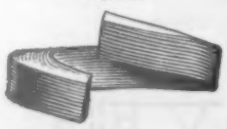

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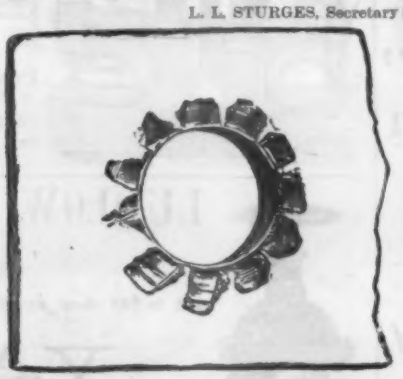

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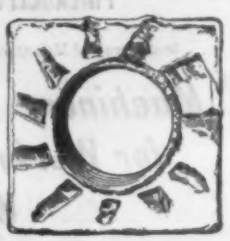

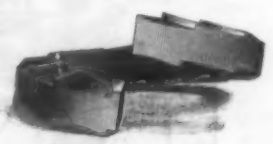

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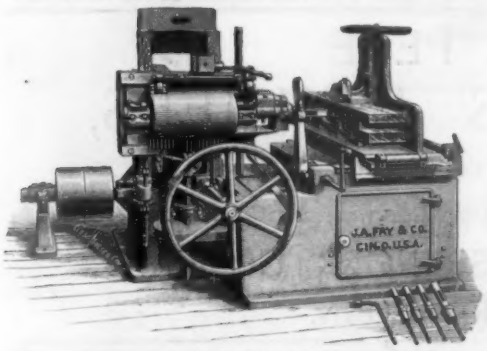

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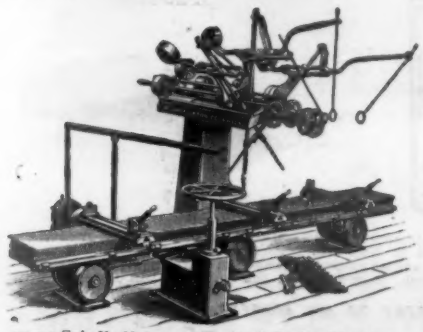

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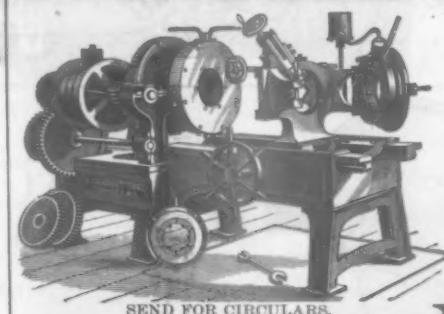

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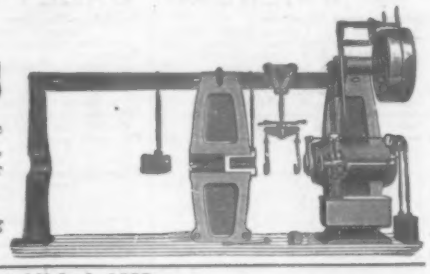

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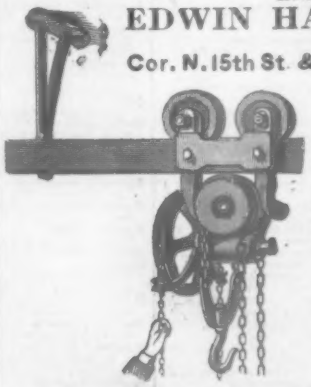

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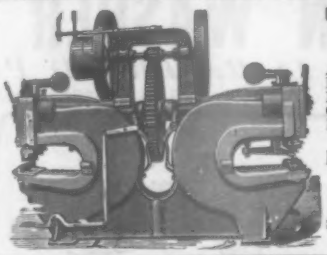

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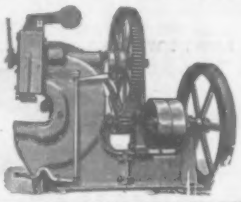

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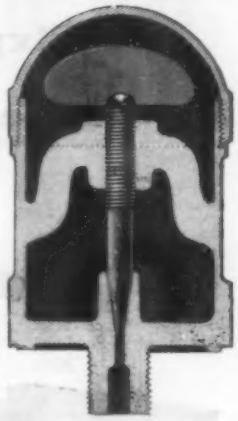

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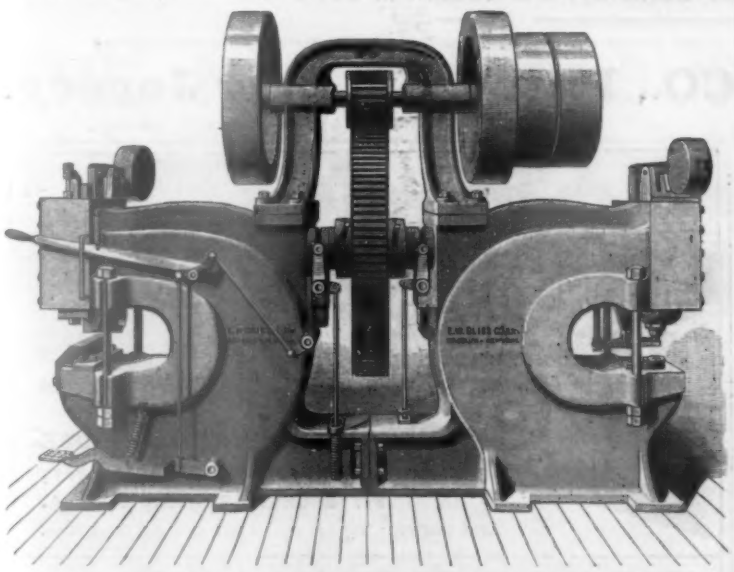

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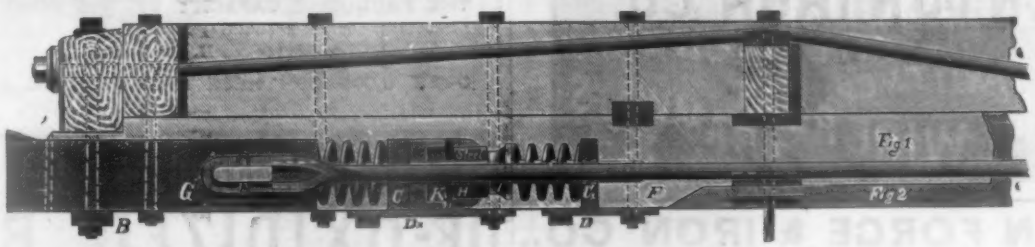

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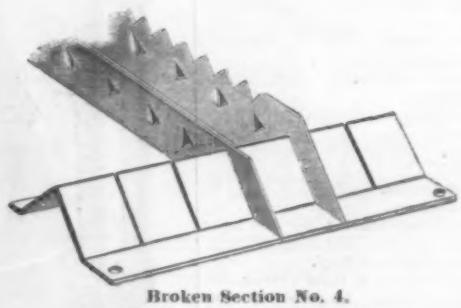

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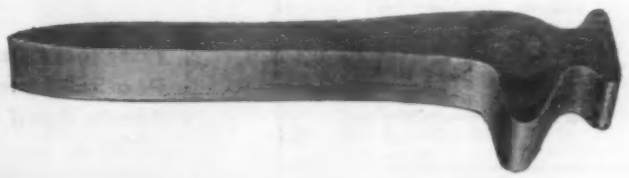

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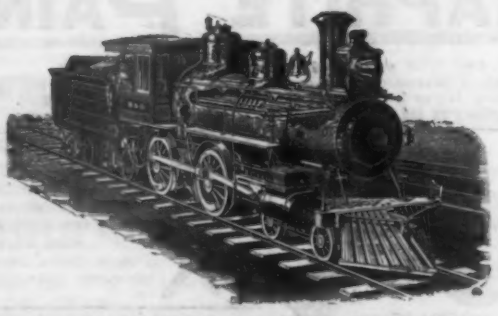

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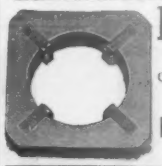

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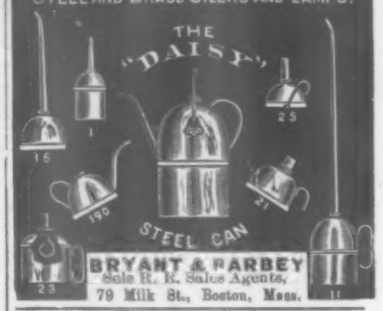

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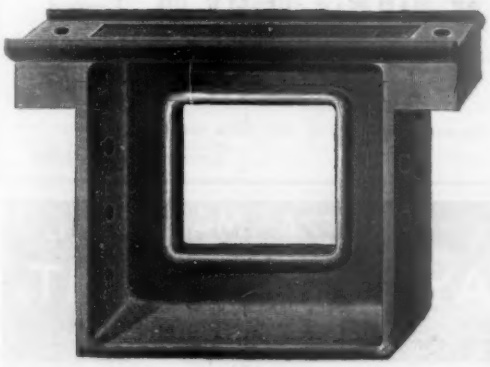

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The verification of these statements and comparisons is within the reach of every railway company.

	Percentages of Breakages.	Life.	Price.	Replacement of breakages. 75% without charge.	Cost per car per year.	Cost per 1,000 cars per year.
ONE of the PIVOTED TYPE	11,862 Couplers for 1 year on basis 10 mos. records. Heads, 27 87/100 Knuckles, 54 89/100	Heads, 3 yrs. 6 mos. Knuckles, 1 yr. 9 mos.	$20.00 per car.	Heads, 25% at $9.20 Knuckles, 25% at $2.80	$2.04	$2,040
DOWLING TYPE	10,676 Couplers for 1 year on basis 14 mos. records. Heads, 3 39/100 Knuckles, 12 64/100	Heads, 30 years Knuckles, 8 years	$20 00 per car.	Heads, 25% at $8.00 Knuckles, 25% at $4.00	39c.	$390

Drop Tests with 1,640 lbs. Weight, N. Y. Central Car Shops, W. Albany, N. Y.

ONE OF THE PIVOTED TYPE.

TEST No. 1.

5 ft. blow. Knuckle closed 3-8 inch Pivot pin slightly bent.
7 " " " " 1-2 " " " badly "
9 " " " " 7-8 " Punched hole through back and side of drawhead at buffing point. Knuckle and pivot pin useless.

TEST NO. 2.

11 " " Guide arm, both lugs, back and shank of drawhead broken.

TEST NO. 3.

18 " " Knuckle, drawhead, lock, pivot broken in many pieces.

STANDARD, DOWLING TYPE.

TEST NO. 1.

5 ft. blow Uninjured.
7 " " Knuckle closed 1-8 inch. Drawhead uninjured.
9 " " " " 1-4 " " "
12 " " " broke at pivot circle. " "

TEST NO. 2.

20 " " " broken. Shank of drawhead bent 1-2 inch out of line.

TEST NO. 3.

(Drawhead, malleable iron; knuckle, forged steel.)

16 ft. blow. Knuckle closed 1-4 inch. Drawhead uninjured.
18 " " Tongue of knuckle cracked. Drawhead uninjured.

To Railway Companies who are willing to make similar comparative tests, we will furnish our Standard couplers without charge. You may select them from our stock or take them from cars in service, and we will replace them, and should you not have any of the other Type at hand we will furnish them also, without charge, and pay all expenses of the tests.

In a coupler confined to the M. C. B. lines it is impossible to effectively distribute 36 1-2 lbs. of steel in a knuckle having a pivot hole, buffing against the side of the drawhead, thereby causing a shearing strain, which breaks the knuckle and lugs from the drawhead and bends the pivot pin, making it inoperative. It is a mechanical impossibility for such a coupler to stand the strain of 60,000-lb. cars (which are 20,000 lbs. heavier than when the pivot type was first introduced.)

The Standard knuckle has 58 lbs. of steel so distributed as to stand the strains and protect the drawhead, is without a pivot hole, and is especially designed for heavy service and the increased weight of cars within the last few years. By the peculiar formation of the Dowling type of coupler, the buffing strain is taken in a line with the shank and draft rigging, thereby equalizing the shock at different points.

One reason why this particular pivoted drawhead breaks more largely than the Dowling type is because in order to allow the lock to rotate on an additional pivot pin in the guide arm the head is cut away so that it cannot be strengthened in its weakest part.

Official records of several of the leading railways of the East and West show average breakages of 6 to 7 drawheads and 3 to 4 knuckles of this form of coupler to one each of the Dowling type, which we think is conclusive evidence that the above claims are well founded.

We believe that there yet remain a few railway systems which the Gould Coupler Co. does not claim to include in its five-years syndicate.

To the managers of these railways we will say, if you think with us, that it is not sound business policy, nor for the interests of the corporations which you manage, to foster this attempt to form a colossal coupler monopoly, involving, as as it does, the equipment and maintenance of more than a million freight cars, with the addition of at least one hundred thousand new cars annually, and if you will open your doors to the competition of the Standard Company, you will be able to equip and maintain your cars at a very much lower cost than many companies are now paying.

Based upon the present cost of iron and steel, the million or more freight cars of the United States can be equipped with the Dowling and other first-class couplers for considerably less than eighteen millions of dollars instead of twenty-five millions or more, which is the ultimate aim of a coupler monopoly; and these cars can be maintained for five hundred thousand dollars per year, or fifty cents per car.

We will contract with railway companies for their entire equipment with our latest improved Dowling type of coupler at $18.00 per car.

Before making contracts for your cars, we shall be glad to show you what the Standard Company is prepared to do in the way of low prices and renewals.

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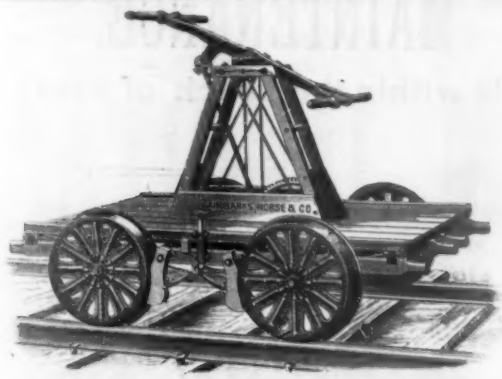

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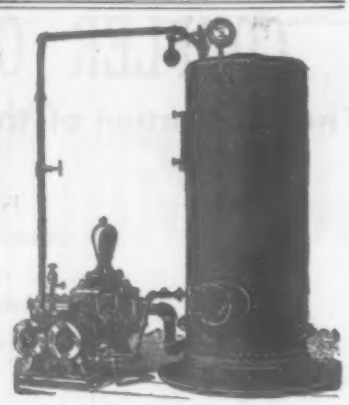

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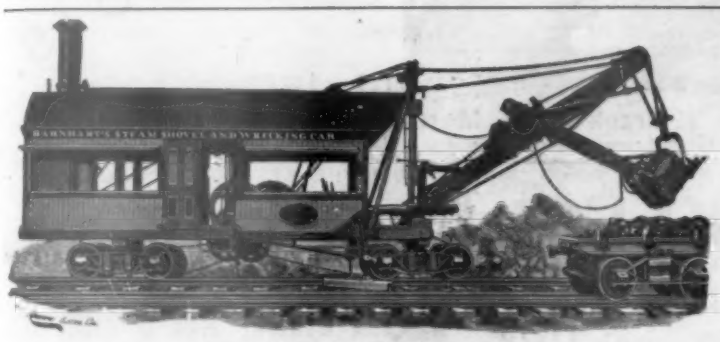

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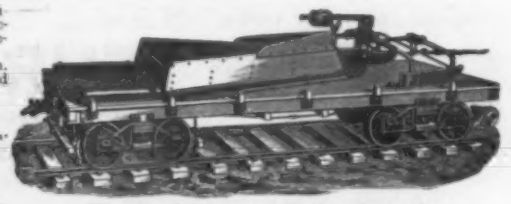

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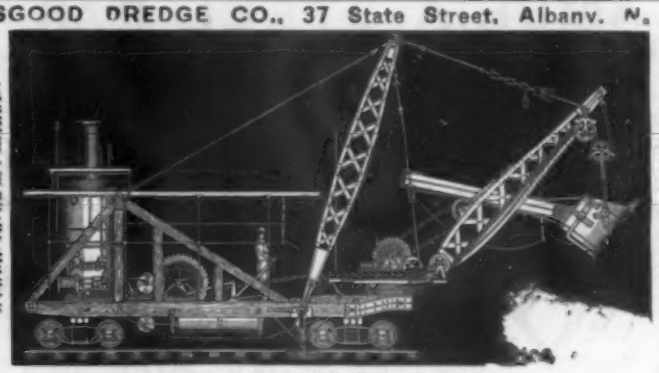

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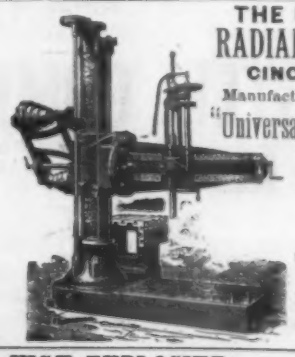

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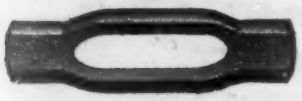

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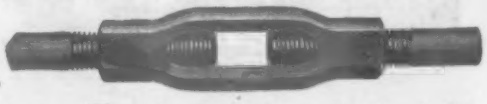

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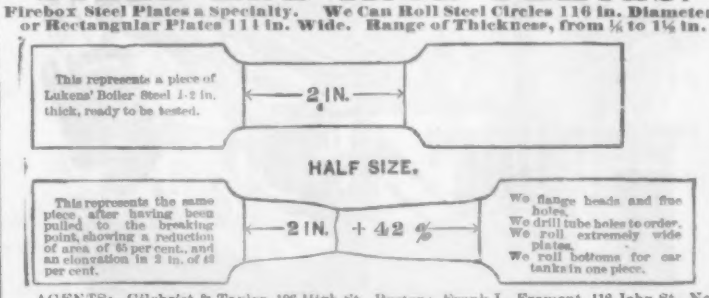
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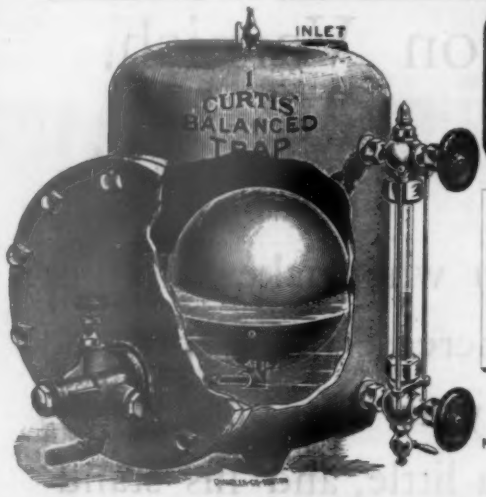

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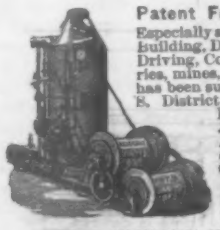

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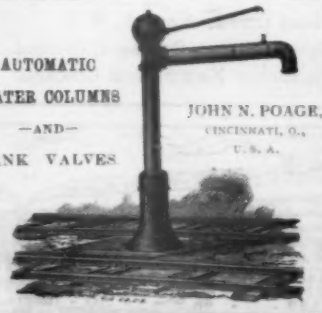

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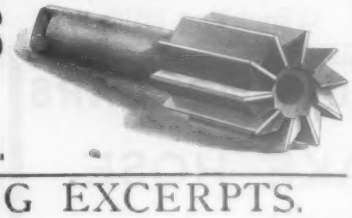

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RAILROAD GAZETTE

FRIDAY, MARCH 11.

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Contributions.

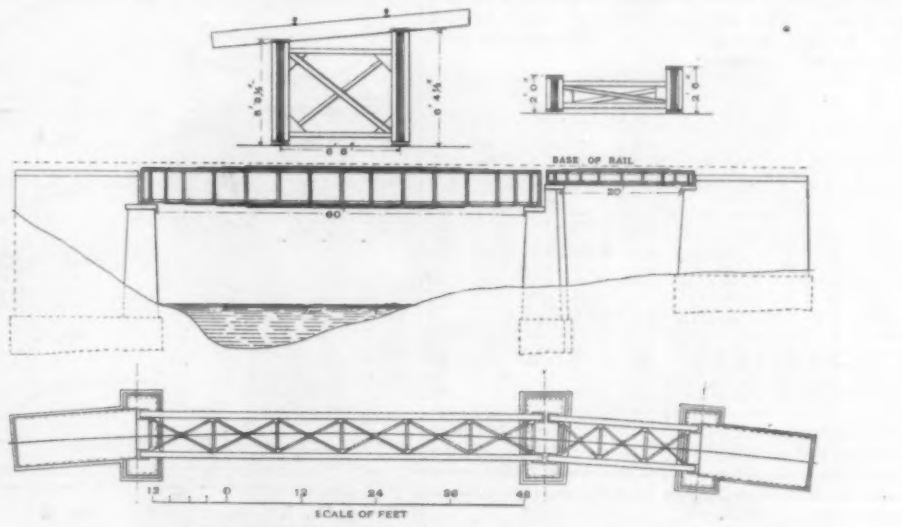
Superelevation on Curved Bridges.

DUNLOW, W. Va., Feb. 23, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to the communication of Mr. H. E Gettys in the Feb. 12, 1892, number of the *Railroad Gazette* relative to the deck plate girder bridge at the first crossing of the Guest River, on the Clinch Valley Division of the Norfolk & Western Railroad, on which the elevation of track is obtained by making the girders of different sizes, I beg to hand you herewith a plan of the bridge in question. It is located about three miles east of Norton, Va. The railroad crosses it on a 10-deg. curve. The bridge consists of two spans, the larger, over the river, being 60 ft., while the smaller, over the wagon road, is 20 ft. The girders are spaced 6 ft. 6 in. centre to centre, the lower girder of the long span being 5 ft. 8½ in. high, while the higher one is 6 ft. 4½ in., a difference of 6 in., which gives about 4½ in. in the track. The girders of the small span are respectively 2 ft. and 2 ft. 6 in. high, Another innovation on this bridge is that the cross ties are placed with their ends lined on a curve parallel to the rails, instead of to the girders, as is usual. This gives a more pleasing appearance than the other method.

EMILE LOW.



Bridge Over Guest River Norfolk & Western Railroad.

Smoke Prevention.

NEW YORK, Feb. 29, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In a recent issue you make the statement that more fuel is used when coal is burned without smoke in a furnace or firebox than there is when no smoke preventing appliances are in use. The truth of that statement is questioned by Mr. James Howard. Perhaps the experience of an old fireman would be of some value in this dispute.

About 1861, I went firing on the Scottish North Eastern Railway under Thomas Yarrow, Locomotive Superintendent, who was the first to use the brick arch in connection with means for admitting air above the fire. He was an enthusiast on the matter of smoke prevention, and held his engine men to very strict account respecting that and about the quantity of coal used. Air was admitted above the fire through vertical bars set in front of the grate. There was not a fireman on the road who did not soon find out that the engines would steam better, and use less coal when the air openings were closed up. This caused smoke, but careful manipulation of the fire-door and blower at stations enabled us to close up the air openings without detection.

I was in the habit of running into Aberdeen, where the locomotives belonging to the Great North of Scotland Railway had a terminus. Mr. Howard says that tests with the locomotives on that road showed a saving of 18 per cent. in favor of smoke consuming. The consuming device used on those engines was the air jet arrangement invented by the famous Daniel K. Clark, who was once Locomotive Superintendent of the road. I am aware from personal knowledge that the enginemen of the Great North of Scotland were in the habit of shutting off the jets when they were away from stations because their use interfered with steaming and were wasteful of fuel. For this reason the invention was allowed to fall into desuetude although it was an admirable smoke consumer.

I have always taken a keen interest in fuel economy and in the prevention of smoke. When I was running locomotives I was always watching the relation between smoke consuming and coal consumption. When I was running a locomotive on a Western raiload I was fortunate enough to be able to attend between trains the chemistry classes at a university. While there I devoted special attention to chemistry in its relation to engineering and of course combustion was carefully studied theoretically and experimentally. This, with my practical experience, helped me to a fairly good knowledge of fuel burning. The conclusions which I have come to respecting smoke are thus summarized in the March number of *Locomotive Engineering*:

> The firebox of a locomotive doing hard work, or the furnace of a factory boiler that has to be forced all the time presents difficulties in burning fuel economically that do not seem to be realized by those who experiment in laboratories. A high furnace temperature and a generous supply of air are antagonists not likely to exist together in the harmony that produces a smokeless fire. If there is a light fire and a strong blast, so much air will pass through that the firebox temperature is likely to be reduced below the igniting point of the gases, and smoke will result. If the fire is thick, sufficient air will not be supplied to all the gas passing off, and it will go into the tubes in the form of smoke. The medium between these extremes is the centre of economy. . . . Fuel can generally be burned to best advantage about half way between the black smoke and the smokeless conditions, that is, with a moderate amount of smoke. A brick arch or other means of mixing the gases as they pass through the furnace brings the point of economy toward the smokeless conditions The firemen who work on roads where premium is paid for fuel saving may be left to find out what kind of firing makes steam with the least consumption of coal. They have discovered that strict smoke-preventing and fuel-saving do not go together. . . With railroad men the trouble generally is, that the firemen have received no training whatever about how to keep down smoke and the well known provisions for regulating the admission of air to the firebox have not been provided. When a spectator can stand on a height overlooking yards, where the switching engines belonging to a variety of railroads are at work, and see those belonging to certain companies painting the atmosphere black, while the engines belonging to other roads cause little smoke, the impression received is that there is bad management somewhere. The degree of smoke prevention practicable would satisfy most sensible people if it were only carried out. If real and absolute prevention of smoke is called for, larger boilers or less duty for those in use is the remedy.

ANGUS SINCLAIR.

The Harlem River and the New York Central Railroad.

NEW YORK, March 3, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The President of the New York Central & Hudson River Railroad made a capital presentation of the demands of the travelers over his road and of the wishes of his company before the Committees on Commerce and Navigation of both houses of the New York Legislature on March 1. This is said to be Mr. Depew's first appearance before a legislative committee for several years, and the result proved that the long course of miscellaneous humorous after-dinner speaking through which he has passed of recent years has not diminished his ability to set forth hard facts and sound arguments in a forcible and at the same time attractive manner.

The occasion of his appearance was to explain to the law makers the reasons which actuated the New York Central Railroad in applying to the legislature for permission to change the grade of its tracks in the city of New York south of the Harlem River. The law authorizing such change is opposed by a few property owners along the line of Fourth avenue between 125th and 129th streets., a distance of about 1,000 ft. The only objection, so far as I can understand, that these gentleman have to the proposed alteration of the tracks, is that the people on one side of Fourth avenue in that immediate locality would be obliged to go from 600 to 800 ft. further than they now do to get from one side of the avenue to the other. With the cross streets from 126th to 129th streets closed to carriage travel across Fourth avenue, as it is proposed they shall be, the residents along about 127th street would be placed very much in the position, as regards crossing the street east and west, as the residents on cross streets between two avenues are toward going north and south. This would be an inconvenience to them no doubt, but the question arises whether the damage done to them would be so great as to warrant the refusal of the legislature to an improvement involving the comfort and convenience of all the passengers who travel over the New York Central, New York & Harlem and New York & New Haven railroads.

The New York Central is, according to Mr. Depew's statement, prepared to expend about $3,000,000 in raising the grades of the approaches to the Harlem River, and raising the bridge over the Harlem River, to the height required by the Secretary of War, namely, 24 ft. above the highest spring tides. This will give room for the passage of all properly equipped vessels without the necessity for opening the draw. I use the term "properly equipped" in this connection, after due consideration. By this term I mean steamers and barges whose smokestacks, flagstaffs and top works generally are so arranged as to be either less than 24 ft. above the water, or to be easily lowered. There is already considerable navigation on the Harlem River, and the existence of this (soon to be) continuous waterway from the Hudson River to the East River with docks along its entire length cannot but be a source of great convenience to the many residents of the upper part of the city and I cannot entirely agree with Mr. Depew in his opinion; that keeping open this navigable stream across the city is "a monstrous piece of folly." It is a monstrous piece of folly, however, for the department of the city government which controls the bridges over the Harlem River, to permit all traffic across the river to be subjected to delays at all hours of the day from the opening of drawbridges to admit of the repeated passage of a few steam tugs which persist in carrying smokestacks and flagstaffs just too high to pass under the bridges.

There are 60 tugs plying on the Harlem River which could pass under the bridges at the height above the river required by the United States government, if their flagstaffs were no higher than their smokestacks. One of these tugs bears the name of "W. H. Vanderbilt." There are 14 other tugs which could pass under the bridges three-fourths of the time between high tides, but they carry flagstaffs which will not clear the bridges at low water. One of these bears the name of "C. M. Depew." There are three steam canal boats which are in the habit of traversing the river, which carry some top hamper that will not pass under the bridges.

In 1891 it was necessary to open the Third avenue bridge 16,285 times; the Fourth avenue bridge, over which the New York Central passes, was opened 11,000 times; the Madison avenue bridge, which lies above the New York Central bridge, and is 24 ft. above high water, was opened only 6,000 times, and the Suburban Rapid Transit bridge at Second avenue, below all the other bridges, and through which more river traffic passes, and which is 24 ft. above high water, was opened 8,681 times. It may safely be assumed that with proper regulation of the boats on the river, and with the bridges raised to the required height, no draw would have to be opened over 1,000 times a year. In the case of the railroad bridge this would be a falling off of about 10,000 openings, which represents in obstruction to traffic across the river about two hours in each day. Now, if the New York Central is willing to expend $3,000,000 to accomplish as far as is in their power this saving of two hours a day, it does not seem as if a few property owners should be permitted to prevent the improvement because it would oblige them to walk about 500 ft. further when they want to travel across town.

The statements made by Mr. Depew with reference to the suggested alternative of a tunnel under the Harlem River in place of the bridge are very good. As he says, "the American people do not want to go underground until they are put there finally," and it is certain that the thousands of residents of the suburban districts do not want to be fired through a dark hole under the

Harlem River if there is any other way possible for them to get in and out of the city.

While Mr. Depew was discussing the improvement of the means of traffic on the New York Central he need not have confined himself to the region above 100th street, but might have come further down, and told the Legislature and the people what a capital improvement he could make in the means of getting down town by giving up the Grand Central Depot at 42d street to through traffic only, and raising two of his tracks, beginning about 60th street, so as to pass through the Grand Central Depot in the second story, and then continue them with an elevated structure between Third and Fourth avenues down to the City Hall, and devote these tracks entirely to local travel. Of this, "more anon."

BEN TROVATO.

The Highest Recorded Train Speed.

Engine No. 385, the compound high speed passenger locomotive built for the Central Railroad of New Jersey by the Baldwin Locomotive Works, which was illustrated in the *Railroad Gazette*, Feb. 12, broke all records on Feb. 26, by running a mile in 39¼ seconds, or at the rate of 91.7 miles per hour, as recorded by a stop watch. In order to insure the utmost accuracy in timing, the observation was made by two persons. As much interest has been manifested in the action of steam in the cylinders of compound engines at very high speeds, we give with this the original indicator diagrams taken at speeds varying from 35 to 91.7 miles per hour. The following table gives the data from the cards:

No. of card.	Speed in miles per hour.	Mean effective pressure, H. P. cylinder.	Mean effective pressure, L. P. cylinder.	Speed in feet per minute.	Rev. per minute.	Total piston movement per minute, both cylinders.	Total pressure, H. P. cylinder.	Total pressure in L. P. cylinder.	Total piston pressure.	Total horse power.
1	35	52.5	22.5	3,080	151	1,208	6,960	8,750	15,510	567
2	42.9	66.3	28.9	3,780	185	1,480	8,880	10,950	19,750	890
3	46	63.8	25	4,048	198	1,584	8,460	9,500	17,960	860
4	50.5	56.3	25	4,444	218	1,744	7,480	9,500	16,960	990
5	58.1	58.8	25	5,100	250	2,000	7,800	9,500	17,300	1,050
6	60	52.5	21.2	5,280	258	2,064	6,960	8,060	15,020	935
7	61.5	40	13.8	5,412	265	2,120	5,310	5,240	10,550	616
8	63.2	46.3	15	5,561	271	2,168	6,140	5,700	11,840	780
9	63.2	41.3	15	5,561	271	2,168	5,470	5 700	11,170	740
10	66.6	52.5	17.5	5,861	287	2,296	6,960	6,650	13,610	945
11	67.9	43.8	16.3	5,976	291	2,328	5,820	6,190	12.010	848
12	78.3	37.5	12.5	6,891	337	2,696	4,960	4,750	9,710	793
13	91.7	37.5	12.5	8,070	395	3,160	4,960	4,750	9,710	930

The following is the data from the different fast runs made by this engine from Feb. 25, to Feb. 29. All the runs were made between Jersey City and Philadelphia and the cards showing the highest speed were taken west of Bound Brook.

ENGINE 385. TEST OF FEB. 25, 1892.

Number of miles run west	90
" " " east	90
" cars hauled west	4
" " " east	4
Pounds coal consumed	7,420
" " per car per mile	10.3
Number hours on road	5 hrs. 23 min.
Actual running time	4 " 19¼ min.
Pounds coal per foot grate area per hour	44.61
" water used	55,280.4
" water evaporated per pound coal	7.45
" ashes remaining	1,358.52
" combustible consumed	6,061.48
" water evaporated per pound consumed	9.11
Percentage of ash	18.3
Average weight of total trains in tons	213
Pounds coal per ton of cars per mile	.17

Light N. E. wind all day with a damp rail in the morning and dry rail in the afternoon.

TRIP OF FEB., 26, 1892.

Number of miles run west	90
" " " east	90
" " cars hauled west	4
" " " east	4
Pounds coal consumed	8,240
" " per car per mile	11.44
Number hours on road	4 hrs. 25 min.
Actual running time	3 hrs. 57½ "
Pounds coal per sq. ft. grate area per hour	54.04
" water used	56,267.5
" evaporated per lb. coal	6.82
" ashes remaining	2,192
" combustible consumed	5,048
" water evaporated per lb. com	11.1
Percentage of ash	24
Average weight of total trains in tons	214.36
Pounds coal per ton of car per mile	.19

For the trip foggy and damp rail.

TRIP OF FEB. 27, 1892.

Number of miles run west	92.2
" " " east	92.2
" cars hauled west	5
" " " east	4
Pounds coal consumed	8,768
" " per car per mile	10.56
Time on road	4 hrs. 33 min.
Actual running time	4 " 10 "
Pounds coal per ft. grate area per hour	54.7
" water used	63,671.1
" evaporated per lb. coal	7.26
" ashes remaining	1,334.16
" combustible consumed	7,433.84
" water evaporated per lb. com	8.56
Percentage of ash	15.2
Average weight of total trains in tons	241.5
Pounds coal per ton of cars per mile	.16

For the whole trip there was a heavy quarterly head wind and good rail.

TRIP OF FEB. 28, 1892.

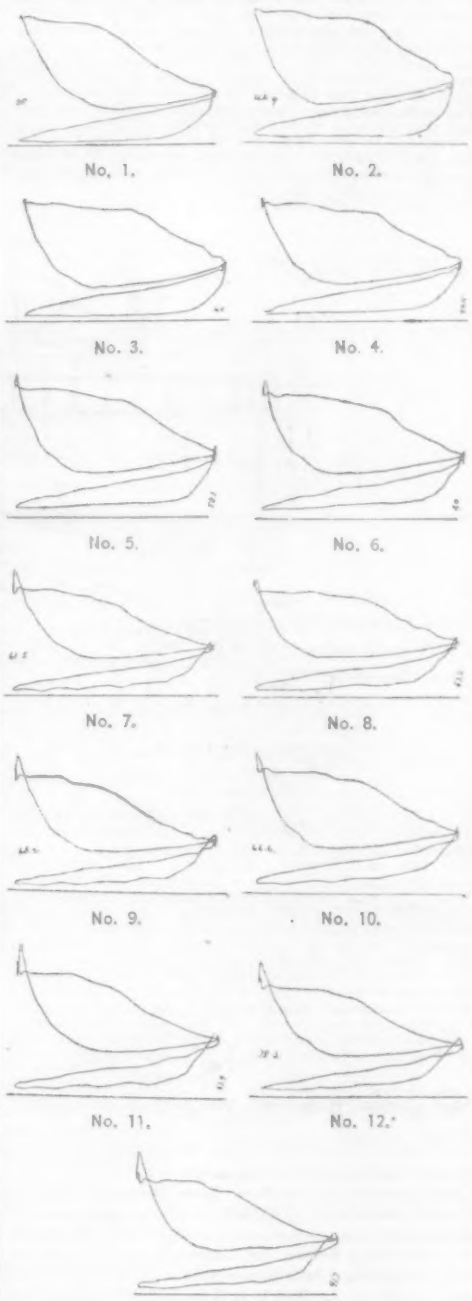
Number of miles run west	92.2
" " " east	92.2
" cars hauled west	5
" " " " east	4
Pounds coal consumed	8,085
" " per car per hour	9.74
Time on road	4 hrs. 45½ min.
Actual running time	4 " 13 "
Pounds coal per rt. grate area per hour	49.88
" water used	61,532.35
" " evaporated per lb. coal	7.61
" ashes remaining	1,640
" combustible consumed	6,445
" water evaporated per lb. com	9.54
Percentage of ash	20.2
Average weight of total trains in tons	241.07
Pounds coal per ton of cars per mile	.15

On the whole trip very cold, heavy wind and dry rail.

TRIP OF FEB. 29, 1892.

Number of miles run west	91
" " " east	90
" cars hauled west	4
" " " east	4
Pounds coal consumed	8,050
" " per car per mile	11 18
Number hours on road	5 hrs. 40¼ min.
Actual running time	5 " 10¾ "
Pounds coal per ft. grate area per hour	40.44
" water used	54,786.82
" evaporated per lb. coal	6.8
" ashes remaining	1,787.1
" combustible consumed	5,263.9
" water evaporated per lb. com	8.74
Percentage of ash	22.19
Average weight of trains in tons	213.5
Pounds of coal per ton per mile	.19

In the morning it was cold, with a heavy wind but a dry rail; in the afternoon rainy, windy and wet rail.



High Speed Indicator Cards from Compound Express Locomotive No. 385—Central Railroad of New Jersey.

See table for details of power developed.

We must defer comment on these records until a future issue.

Massachusetts Railroad Commissioners' Report.

The 23d annual report, which is dated January, 1892, with statistics to June 30, 1891, has just been sent to the legislature. It is signed by George G. Crocker and Everett A. Stevens, Commissioner Kinsley having died on Dec. 26. Mr. Crocker has resigned since the report was made. The report is accompanied by a new map showing each railroad line by a distinctive color.

The first subject taken up is the necessity for harmony in the legislation of different States, which was the subject of a conference of railroad commissioners of all the New England States Dec. 11. No railroad company appeared to make any complaint or suggestion at that conference, although an invitation had been issued. Authority is asked to compile and print the general railroad laws of all the New England States and of New York, this being in line with a former recommendation of the legislature.

A careful summary is given, as in previous reports, of the progress in continuous heating for passenger trains in Massachusetts. The Boston & Maine and the Old Colony still have about one-half of their cars heated by individual heaters, but the other roads now heat practically all their trains from the locomotive.

The question how many brakemen are necessary on each freight train has been investigated by order of the legislature. The general practice in Massachusetts is one brakeman for each ten cars. No recommendation is made, though the opinion of the board seems to be that there will be no good reason for diminishing this number, even when train brakes have been adopted.

The report, like those of previous years, includes a careful description, with tables, of the railroad bridges of the state, made by Mr. George F. Swain. The expenditures of the various roads for bridges are tabulated, but the value of the statistics is somewhat impaired by the fact that overhead bridges are in some cases included. This is the case on the Boston & Albany, which spent $318,000 in 1891, as compared with $88,000 in 1890.

The statistics of accidents are not made in the form commonly used, and comparisons with previous years are not easily made, because the change of the end of the fiscal year from Sept. 30 to June 30 causes some of the accidents to appear twice. For the year under consideration the number of passengers killed was 39 and passengers injured, 95, of which 22 killed and 52 injured are charged to train accidents, etc. All of the 22 killed are chargeable to the Quincy disaster of August, 1890. The number of employés killed during the year was 67; injured, 341. The number of persons injured at highway crossings was 84, of whom — were killed. The number of trespassers killed was 129; injured, 71. Of these 200 trespassers, 166 were walking or lying on the track and 34 were on cars without right. The appeals heretofore made for additional legislation to prevent trespassing are again urged.

The subject of safety appliances fills a long chapter, which opens with the statement that 10 employés have been killed and 184 injured in coupling and uncoupling cars, these injuries constituting 47 per cent. of all the accidents to employés. In the United States for the year ending June 30, 1890, this percentage was 33. Comparisons are made with the accidents from overhead obstructions, falling from cars, etc. The action of the National conference of railroad commissioners is reported and discussed, but no definite recommendation is made. "While the United States should insist upon uniformity it also seems clear that the selection of the type of coupler should be left with the railroad companies, provided that they take action within a reasonable time." Chairman Crocker's action on this matter at Washington is familar to the readers of the *Railroad Gazette*.

The roads promised last year to more fully comply with the law requiring them to block frogs, switches and guard rails, but they have not fully kept their promises.

The brake power of passenger trains has been improved during the past two years, but still falls short of a reasonably high standard. The Commission has found several instances where emergency stops required far too great a distance. It is believed that the engineers would handle the brakes better in emergencies if they were to make experimental tests occasionally, and the companies are recommended to have such tests made and recorded.

Twenty-one grade crossings have been abolished during the year under the recent law apportioning a part of the expense to the state. A statement of the proceedings in each case is given in the appendix. The total estimated cost of the alterations recommended by the various special commissions, so far as reported to the board, up to June 30 last, was $379,959. Of this amount the portion to be paid by the Commonwealth was $94,990. Thus far no actual payment has been made by the Commonwealth under the act.

Several new grade crossings have been approved, but they are on private sidings where the speed is not over five miles an hour.

A table is given showing details of 116 crossings of steam railroads by street railroads, of which 26 are used by electric cars. The new dangers incident to electric propulsion are vigorously set forth. The accident at Brockton, Feb. 2, 1891, was, it appears, at a crossing which had an interlocked signal to stop approaching trains, but the signal was not far enough from the crossing. Two other mishaps at crossings of this kind are reported. The commissioners recommend that permits for the use of crossings by electric cars should be granted only in case of absolute necessity, and that where such privilege is granted the law should require suitable crossing frogs to be laid, and signals interlocking with the gates provided.

The board presents a carefully prepared plan of the terminals of the Boston & Maine and Fitchburg roads in the northern part of Boston, which was prepared by Mr. Thomas Doane. A law was passed in 1886 which aimed to compel the Boston & Maine to take the necessary measures for a new union station, and to compel the Fitchburg to co-operate, and the work should have been done by July, 1892, but practically nothing has been done, and so the commissioners employed Mr. Doane. The

evils of the eight railroad crossings and fifteen street crossings which this plan would abolish are about as bad as could be imagined, and Mr. Doane's plan seems, from a cursory examination, to be a good solution of a very perplexing problem. The commissioners estimate that the delays to passengers, which it is possible to save by avoiding the present stops, etc., would aggregate 110,000 days of 10 hours each.

The zone system of passenger tariffs in use in Hungary and Austria for the last two years has been investigated, by order of the legislature, and 40 pages of the report are devoted to a very careful discussion of the whole subject. The fallacy of the theories which have been presented in several quarters looking to the adoption of the Hungarian system in this country is already familiar to the readers of the *Railroad Gazette*, but it may be of interest to again note that, as compared with Hungary, Massachusetts has twice as great a population per square mile, five times as much railroad per square mile, and furnishes 30 times as many passengers in proportion to its population. The reasons why the plans adopted in Hungary are neither applicable nor necessary in Massachusetts are set forth with a clearness which should be convincing, even to legislators.

One essential feature of the Hungarian passenger arrangement is the division of the train service into classes. On this subject the report says:

For such classification of the service there is in the United States comparatively little demand. Class distinctions do not harmonize with the spirit of our institutions. For the issue of second class tickets for transportation within the limits of this state there is practically no demand. Second class tickets are sold for through traffic going outside of the state, but the sale of these tickets is so small that separate cars for second class passengers are run only on the Boston & Maine and Old Colony, and on those roads only on certain through trains. Unlike the practice in Europe, our station accommodations are equally open to all. The station accommodations of the parlor car passenger are not different or separate from those of other passengers. The parlor car passenger buys the same kind of ticket as other passengers, and on our trains any passenger can at any time, whenever he sees fit, walk into the parlor car, take any disengaged seat and keep it so long as he pleases, paying therefor the established extra fare.

Street railroads, the oversight of the affairs of which constitutes a share of the commissioners' work, are reported upon at length, especially with regard to accidents. Accidents on the lines of the West End Company (Boston) are twice as frequent, per car mile, with electric as with horse cars. An efficient fender (pilot or cow catcher) for all sorts of road has not yet been invented. There are 230 miles of electric road in the state, of which 10 miles is operated by storage batteries. The length of steam railroad in the state is 2,087 miles, no new road having been built during the year.

New Pipe Threading and Cutting Machine

This engraving shows a No. 3 machine for threading and cutting off steam and gas pipe made by Messrs. D. Saunders Sons. The belting and gearing have been arranged to get suitable power and speed for the various sizes of pipe and the arrangement is thought to be, in this respect, superior to most others in use. The die shown in place in the machine is adjustable and expanding, operated by cam slots to open and close the chasers. The die and head to which it is attached is so constructed that pipes may be alternately threaded and cut off without removing the die from the machine. The die being in front of the cutting head can be brought close to the gripping chuck and short pieces of pipe can be threaded. This advantage often saves the use of a nipple socket. When the pipe is to be moved to adjust it for cutting off any length, the die and plate it is attached to is pushed to one side upon ways, allowing the pipe room to pass through the cutting head without passing through the die.

The cutting off tool is operated by the upper hand wheel. Two hardened steel jaws are used for steadying the pipe while cutting off. They are operated by a right and left hand screw, centring the pipe. The jaws are adjustable to compensate for wear. On the rear end of the spindle there is a self-centring two-jawed chuck for steadying the pipe.

Buildings and Structures of American Railroads.*

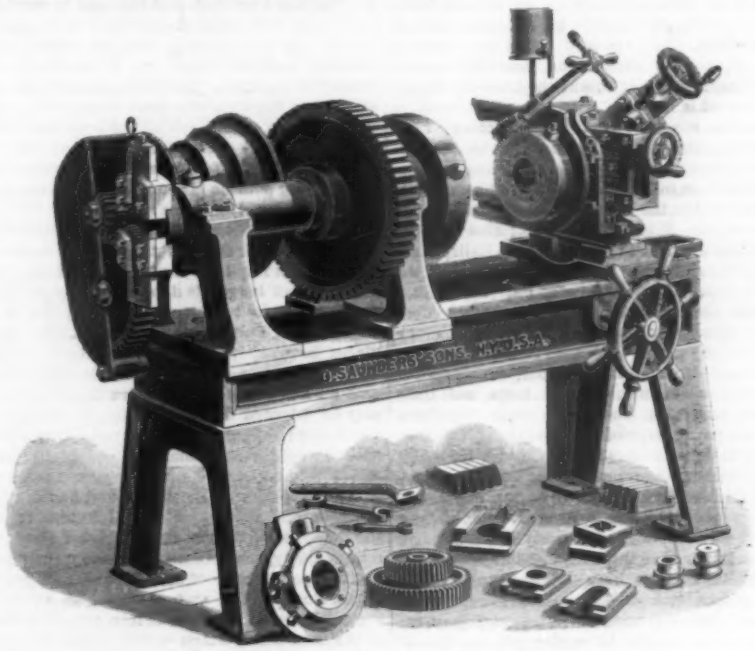
No. 16.—ENGINE HOUSES.

BY WALTER G. BERG.

While a permanent and fireproof construction is desirable, in fact, practically necessary, where a heavy traffic is to be considered and the location is permanent, it is a mistake to run up the construction account of a small road or of a new enterprise with expensive structures for housing engines. After operating a new road for some time it is frequently found desirable to make a change in the engine runs, to transfer a proposed shop system or yard to another point, or, through combinations with other roads, important junction points are created which were never thought of at the outset. The writer knows of numerous cases where expensive roundhouses have been torn down or else used for other purposes than originally intended. Frame buildings sheathed on the outside with weather boarding and roofed with tarred felt or a gravel roof, are extensively used on the Northern Pacific Railroad. Other roads use frame structures, sheathed with corrugated iron and roofed with corrugated iron, tin, slate or gravel roofing. Then, there are buildings of a more substantial character, with brick or stone walls, iron fronts and wooden, combination or iron roof trusses, covered with a slate or gravel roof.

The advantages of a square house with special track approach are, that delays from breakdowns, blockades or loss by fire, are not so liable to occur, the house is cheaper and simpler to build, especially for a small house with only a few stalls, and the engine-house foreman will have a better oversight over the whole building than in a round house, which is quite important where there is considerable work and repairs to be done around the engines. But the disadvantage of a track approach is that it takes up considerable ground space.

The advantages of a square house with a transfer table are, that it takes up proportionately the least ground space of any system, a cheaper and simpler house can be built, a better oversight had of the work going on in the building, than in a round house, and the extension of the building indefinitely is only limited by the land available. For a small house the construction of a transfer table would not pay. The disadvantages are, however, that breakdowns are more liable to cause a blockade, and, in case of fire, the engines cannot be removed as expeditiously from the house as in a house with track approach, although, by the use of a space between the house and the transfer table, as above described, considerable can be done to eliminate this latter objection.



PIPE THREADING AND CUTTING MACHINE.

The advantages of a round house with a turntable are economy of ground space, as compared with a large house with a track approach or a square house with tracks leading to a turntable. A good light can be thrown on all engines, and the width of the stall is greatest at the outer wall, so that the best light and the most floor surface around the engine exist at the head of the engine, as engines almost invariably run into a round house head first. A round house can also be built in sections at a time, without in any way harming the general design, as the wall at the end of each section, if built solidly, can remain as a fire wall. The objections to a round house are, that the building, as compared with a square house, is more costly and complicated, and a general oversight of the work going on in the house is not as easy as in a square house. A breakdown at the turntable or on the main track leading to the house might cause a serious blockade, and, in case of fire, a round house, in combination with a turntable, even under the best conditions, is not much better than a fire trap.

Practice, in this country, has developed beyond peradventure, that the proper roofing material to use is slate or a tarred felt or gravel roof, as the sulphurous gases from the smoke of the engines destroy any other form of roofing material very speedily. If slate is used, a higher pitched and heavier roof has to be built, which causes greater expense, and the building being so high, it is more difficult to heat in winter. But a slate roof is more durable, particularly if a first-class grade of slate is used fastened with copper nails and laid on two or three layers of building paper. A tarred felt or tarred felt and gravel roof combined, especially the former, will allow of a very light roof construction, but it is not very durable as against the weather, although it will withstand the gases penetrating to it from the interior of the house better than the usual metal roofing materials.

The ventilation of an engine house is a very essential element. Large, properly designed ventilators at the peak of the roof are desirable, but in northern climates provision should be made for closing the ventilators when desired, so as to keep the heat in the house when required, while in southern sections of the country, plain open-louvered ventilators are admissible. Smokestacks should be provided at the point over the stalls where the smokestacks of engines are when in the house. These stacks should have a movable lower bell-shaped piece, that can be lowered over the smokestack of the engine. The top of the stack should be arranged so as to exclude wind and weather. As sheet-iron smokestacks are eaten out very quickly, cast iron is used to quite an extent, but it makes a very clumsy and heavy construction. Galvanized iron stacks have been introduced with considerable advantage, and terra cotta flues have also been put on the market for this purpose.

The floor in an engine house is made either of cinders, cement, stone, asphalt or timber. In all cases it is preferable to have the floor level flush with the top of the rails of the house, so that trucking can be done through the house more conveniently. The main objection to the asphalt flooring is that heavy trucking and the use of hydraulic jacks, unless proper care is taken, will wear ruts and holes which are not very readily repaired. While a cement floor has similar objections, repairs can be made more easily and, what is of a further advantage, they can be made by the ordinary help connected with the engine house. In sections of the country where stone slabs are cheap and easily obtainable, it will be found that they make an excellent floor requiring very few repairs. Except on newly made ground, the use of plank floors on joists is not to be recommended, unless, possibly, in sections of the country where timber as a building material predominates. In all cases the floor should be properly dished, so as to allow drainage of the floor into the pits or into gutters. Cleanliness of an engine house floor is an essential feature of good management and flooring materials that will allow the floor to be frequently flushed with water, without detriment, should have the preference.

The drainage of an engine house should be first class, as all the elements which contribute to the rapid deterioration or the easy blocking of a sewer are present in the drain leading from an engine house. The best method to drain the pits is to allow them to discharge at the lower end through a grating into a properly designed cesspool, which in turn overflows into a box sewer, running around the house, between the ends of the pits and the wall of the building. The gradients of the drains should be ample, if possible, to allow water to run easily, and the box sewer mentioned should be large enough to allow a man to enter and clean it out, by providing man holes at proper places. If the closed sewer is not made large enough for a man to enter, then it should be an open box drain, covered with timber or stone slabs in such a way as to be easily accessible without having to tear up the floor of the house in the vicinity of the sewer.

Engine houses are heated by stoves or by steam pipes. For large houses, where feasible, steam heat is preferable, as it reduces the danger from fire and does not occupy floor space. The main steam supply pipe is usually carried through the house overhead, hung from the roof, but where an open box drain exists it will be found convenient to carry water and steam pipes on brackets in the upper part of the drain, as they are thus out of the way and yet readily accessible for inspection and repairs. As to the proper location of the steam coils considerable difference can be noted in practice. The placing of the steam coils along the sides of the engine pits has the advantage of allowing the heat to spread more uniformly throughout the house, and, in addition, it allows the heat to strike the bottom of the engine first, which is very desirable in winter, so as to thaw out the

*Copyright, 1890, by Walter G. Berg, and condensed from a forthcoming book on the subject.

ice and snow adhering to the machinery when the engine is housed after a run. The only objections are that the steam pipes narrow up the clear width of the engine pits, which is objectionable in making engine repairs, and the closeness of the steam pipes and the direct heat is objectionable for the wipers and repair men, who have to work in and around the pit. In other designs the steam coils are placed along the walls, which method has the objection that the general heating of the house is more difficult and more heat is lost in that way, and if work benches are placed along the walls it is very undesirable for the workmen to have to stand in such close proximity to the steam coils. In other houses the steam coils are hung from the roof, below the roof trusses, the heat being thrown downwards and thus diffused throughout the house without causing any inconvenience to the workmen. This method, however, requires more steam to keep the temperature at the proper degree under the pits and at the floor level, but, where the roof is low and flat, the loss is probably not very serious. In general it can be said that in northern sections of the country low flat roofs are preferable to high, double-pitched roofs, as the heating of the house in the former case is so much more readily effected.

Good light is a most essential requisite to insure cleanliness in the house, a thorough cleaning of the engines, and to facilitate inspections and repairs.

The engine doors in an engine house are always hung in pairs and should be well glazed, unless ample light is otherwise provided. They are very frequently made to swing outwardly, which allows the house to be made about five feet narrower, but this method has the objections that the wind is liable to catch the doors and, in Northern climates, the snow and ice collecting on the doors and on the ground will give considerable trouble. Within recent years steel roller shutter doors for engine houses have been introduced on a number of railroads, among others in the roundhouse of the Housatonic Railroad, at Bridgeport, Conn.; also in the roundhouse of the Chicago & Northwestern Railroad, at West Chicago, Ill.; and also in the roundhouse of the Lehigh Valley Railroad, at Towanda, Pa. The advantages are that the door is fireproof and no floor space has to be reserved inside the house to swing the doors open. The objections are, that the cost is in excess of an ordinary wooden engine door, although not very heavily in excess of the cost of a large, well built and well glazed circle top door. The main objection, however, is that the lighting of the house has to be provided by transom lights over the doors or skylights in the roof. If, however, the light in the house is otherwise well provided for, independently of the doors, and a first-class fireproof structure is desired, then the use of steel roller shutter doors can be highly recommended.

The questions involved in the construction of the engine pits are similar to those discussed previously in the article on ash pits, published in the issue of the *Railroad Gazette* of Nov. 7, 1890, although the deteriorating effects do not exist to such an extent in engine pits as in ash pits. The pits do not have to be lined with fire bricks.

An ample water supply is needed to clean the engines, wash the floors, flush out the pits and drains, and wash out the boilers. Engines have sometimes to take water by means of a small hose before leaving the house. Hydrants should be provided at intervals along the outside walls, or else sunk in pits under the floor at intervals between the stalls, the opening being covered with a suitable grating or door.

Wrought iron or steel plate girder turntables are the best in use, provided they are not built to carry only the weight of an engine the same as for a bridge, but are proportioned with a great excess of strength to give ample stiffness, and also to allow for the probable increase in the weights of engines. The masonry connected with a turntable, and especially the foundations, should be of the very best for the purpose, as a settlement of the centre pier, or of the circular track, would prove very detrimental to the easy working of the table. In northern climates a very good design is to keep the paving of the pit and the bench wall for the circular rail some distance below the bottom of the table, so that the operation of the table does not have to be stopped for light snows, and it is only when a heavier snowfall takes place that the pit has to be cleaned out.

With the exception of the greater danger in case of fire, a timber roof has the advantage over an iron roof in an engine house, that it is not attacked so seriously by the sulphurous gases contained more or less in the atmosphere in the upper part of the house, so that a timber roof, kept well painted or whitewashed, will give, probably, in the long run, about as efficient a service as an all-iron roof truss. In regard to the fireproof features of the all-iron engine house roof truss, as usually made, it will prove, as a rule, in case of a fire, to be an illusion, the same as the bulk of so-called fireproof constructions in buildings. The usual style of an iron truss for an engine house is the triangular system, with deck beam principal rafters and the bottom chord formed of tie rods. The lateral bracing throughout the house consists of light rods, more serviceable for erection purposes and for lining up the trusses, than for stiffness. The trusses are, therefore, dependent for lateral stiffness on the timber purlins and roof boards, so that, when the latter are destroyed by fire, the trusses will not have sufficient stability to stand alone. If iron roof trusses are to be adopted, the writer considers, that more attention should be given to building stiff trusses, with more lateral stability and bracing and stiff bottom chords. Where a slate roof is to be used, the double-pitched high roof is preferable. The adoption, however, of a low, single pitched roof is the very best construction in case a tarred felt or gravel roof is to be employed. For roofing over large, square house there are advantages in a "saw-tooth" system of roofs. In general, it can be said, that the introduction of posts in the interior of an engine house, if not placed too close to each other, is not such a detrimental feature as frequently assumed in designing an engine house.

In order to facilitate the removal of engines from a house in case of fire, it is desirable to have, and the writer has built, engine houses with a down grade on the tracks in the house, and extending across the space in front of the house for some distance.

Tracks are arranged around a turntable in three ways. First, so as to omit frogs entirely, the outside flanges of the nearest rails of neighboring tracks just touching each other at the face of the turntable pit. The second method is to allow the same two rails, just referred to, to be joined together the same as in a frog; in other words, to place the point of the frog, if it can be so called, at the face of the turntable pit, which method is, however, not desirable, as the point is soon battered down by the blows received when engines pass over it. The third method, and the one in most general use for houses with large diameters, is to arrange the tracks around the turntable to suit whatever stall angle is selected, inserting frogs, and if necessary crotch-frogs, wherever required. In this case, the only point to observe is to see that the dead ends of the rails around the turntable coping can all be accommodated without interfering with each other, and that the frogs where inserted, do not interfere with each other, and that the nearest frog point is far enough away from the turntable pit to allow the frog to be introduced.

The angle of the stalls having been settled, the diameter of the inner circle of the house is dependent on the panel length required for the inner front of the house, which panel length is determined by the size of door opening required in the clear, plus the width of the timber post, iron column, or brick pier, desired to be placed between the doors. The width of the house is determined by the length of the largest engine in use, plus an allowance for the extra length of engines that may be adopted during the life of the house, plus an allowance to enable the doors to be swung inwardly, in case this construction method is adopted, plus whatever width is desired to be maintained for a passage way along the outer walls of the round house. There is one other special feature in round houses that attention should be called to, especially where a slate roof is to be used, namely, the necessity of cutting the purlins on the outer slope of the roof convex, and the purlins on the inner slope of the roof concave, so as to follow the conical shape of the roof better, avoiding sharp angles at the truss lines, which would cause the roofing material to lie unevenly in addition to not presenting as good an appearance. Where a tarred felt or gravel roof is used, the cutting of the purlins throughout is not so essential, the ends of the purlins, where they join at the truss line, being simply adzed down or shimmed up to make the break from one panel to the other less noticeable.

[TO BE CONTINUED.]

The Structure of Rail Heads.

At a meeting of the Verein für Eisenbahnkunde, held at Berlin last October, Dr. Wedding, the well known German metallurgist authority, delivered a lecture on the structure of rail heads, from which we extract the following:

To begin with, Dr. Wedding referred to some of the results of some microscopical examinations of a Belgian Goliath rail which he had made a year previous, and which showed that not only the interior of the rail head, but also the head near its wearing surface, was so loose in texture that there seemed to be a pronounced tendency to rapid and dangerous wear. These results brought about further investigation in the same line, the rails for these later examinations being obtained from the government roads of Alsace-Lorraine.

Dr. Wedding's lecture was accompanied by a number of illustrations representing photographic reproductions of fractures of test pieces cut from different parts of the rails examined, and polished and etched surfaces of rail sections, showing the peculiarities of molecular structure encountered. These, and the detailed considerations regarding them which Dr. Wedding submitted, we do not reproduce.

The results of the investigations, according to Dr. Wedding, show unmistakably, in the first place, that looseness of texture of the metal at the wearing surface of the rail increases with the size of the head. Porosity in the interior, however, is encountered only in rail heads of considerable size, and increases so rapidly with increase in the size of head that in the case of rails weighing from 50 lbs. per yard upward there is found practically a cylindrical mass of spongy metal, extending longitudinally through the head. In all cases, however, he finds the portions of the head near the wearing surfaces more open in texture than those immediately underneath.

Dr. Wedding varies the question, whether, after all, it would not be advisable and possible to so modify the method of rail manufacture as to at least do away with the soft wearing surface, and thus avoid the combined, possibly disadvantageous, effects of soft interior and soft wearing surface. In the universal method of rail rolling, the rail head retains a much higher heat than any other portion of the rail, the immediate result being a comparatively coarse crystalline structure and blowholes on cooling. The upper, wearing surface of the rail, further, is not subjected to any normal pressure, the rail passing through the rolls in a position which is at a right angle to that which it has when laid down for service. This is the point to which special attention is directed, and which accounts for the fact that even in the case of small rail heads, in which the interior is close grained and compact, the wearing surfaces are comparatively spongy in character. Both evils combined have also made it questionable whether a very great increase in the size of rail heads is not to be discouraged. If the present tendency toward large-headed rails is to be followed up, then, so Dr. Wedding thinks, the spongy nature of the wearing surface of the rail can be avoided only by a change in the rolling process—the change to be such that the wearing surface of the rail will receive pressure as well as the other portions.

In order to determine whether such pressure on the upper surface of the rail head would lead to good results, Dr. Wedding examined two very large street rails, comparing the results with those obtained from a heavy rail turned out at the Seraing works. The specimens taken from these rails were ground, polished and etched and examined through the microscope. In the street rails it was found that the blow holes nearly all followed the line of the grooves near the surface. In the Seraing rail the blow holes were distributed throughout the head, and near the upper surface were spherical. In the street rails the blow holes were spherical only in the thick portions of the head, at the sides af the grooves, while near the grooves, where the most wear in service is concentrated, they were elongated and flattened like those in the web. This would seem to indicate that all that is necessary to prevent a spongy structure of the head, due to comparatively large spherical blow holes and the tendency to crystallization on cooling of the metal, is to exert a strong pressure on the top of the head during the finishing passes of the rail through the rolls. This, Dr. Wedding points out, could be secured by adopting an arrangement similar to that used by the Phœnix Works (the makers of the street rails examined), and which provides, between the horizontal rolls, a third roll, disposed vertically and acting directly on the rail head, and Dr. Wedding suggests rolling the head with a ridge along its upper or wearing surface, which could be rolled down in the finishing pass by the vertical roll, making a smooth surface.

The proper degree of hardness of rails was briefly discussed. Dr. Wedding stated that in examining, through the microscope a polished section of a rail taken through the wearing surface, one could discover a rough and uneven edge, caused by small blow holes. In the case of a hard rail, the passing wheels break off the little projections, hence the desirability of limiting the tensile strength of rails to about 69,000 lbs. per square inch. In the case of a soft rail, on the other hand, the projections are rolled down and flattened out by the wheels, giving rise to a scaly formation, which may afterward break off without leaving new sharp edges to be again attached. This would seem to point not only to the expediency of avoiding the use of very hard rails, but also to the desirability of securing for the rail as dense as possible a wearing surface blow-hole without outcrops.

Director Bork pointed out that with very hard rails there is considerable wear of wheels, and that it will not do to correspondingly increase the hardness of wheel tires in attempting to counteract this wear, there being danger of breakage of such tires in service.

Refrigeration from Central Stations.

The use of refrigerating machinery has become so wide spread, and the erection of new cold storage warehouses and plants for the manufacture of ice is now such a frequent occurrence that comment is ordinarily uncalled for, but a comparatively recent application of refrigerating principles in St. Louis, Mo., is sufficiently novel to deserve more than a passing notice. In this case the refrigerant, in the form of liquid anhydrous ammonia, is distributed through pipe lines to the consumers' cold boxes without the use of brine. The central station contains simply an ammonia refrigerating plant on the absorption system, together with storage tanks of large capacity. In this system there is no heavy machinery, but simply a number of stills, condensers, storage tanks, circulating pumps and steam boilers. Ammonia gas is evaporated from a strong solution by steam heat, and the gas is condensed at a pressure of about 150 lbs. per square inch. This liquid ammonia is admitted in a small stream to the refrigerating or expansion coils, where it evaporates at a lower pressure, the necessary heat of evaporation being derived from the surrounding air, brine or water. The ammonia gas thus produced is absorbed by weak ammonia liquor, forming a strong solution, the heat which is developed being taken up by circulating water. The strong liquor passes to the still for re-evaporation at high pressure, as already stated. This is, briefly, the cycle of operations in any absorption machine.

In the distributing system, as used by the St. Louis Automatic Refrigerating Co., and in Denver, Colo., there are three lines of pipe laid in conduits under the streets. The liquid ammonia goes out through the liquid pipe, which is but 1¼-in. pipe for mains about a mile long, and the ammonia gas is returned in the vapor pipe of larger size. Each cold box contains coils of pipe, which form a cross connection between the liquid and vapor pipe lines. The liquid is admitted to the cold box expansion coils through a small valve, which is regulated and controlled by the company, the amount of opening depending upon the degree of refrigeration desired. In this way it is practicable to maintain a box or cold storage room at any desired temperature, suitable to the character of the contents. At each cold box cross connections to the third or vacuum pipe are put in, by means of which a coil can be shut off from the mains, connected to the vacuum pipe, and the ammonia gas pumped out by pumps at the central station, thus avoiding any nuisance from gas in case repairs become necessary or changes are desired.

The St. Louis system of mains has now been in successful operation for about a year and a half, and no difficulty has been experienced on account of leaks. Practically, all large cold boxes along the line of its mains, for which ice was originally used, are cooled in this way, including those of the Southern and Laclede Hotels and Faust's. It is the intention to erect a new central station, and lay five miles more of pipe during the coming summer. Many novel applications have been made, as, for example, cooling drinking water for a large retail store on its way from the mains to the faucets; the combination in one box of a cold box for meats, etc., a cooling box for bottles, and a compartment for making for making ice; two cold boxes "in series," where different degrees of cold are required; and the piping of a restaurant room with wall coils by which the room is kept at a temperature of from 10 to 20 degrees below the outside temperature in summer, the same coils being used for steam heating in winter.

The evident flexibility of the system suggests its applicability to railroad uses at large terminals and supply points for sleeping and dining cars, as the power station may be located where it can be most economically operated, and the refrigerating boxes, etc., placed where they would be most convenient. The commercial practicability of such applications will, of course, depend upon the relative cost of coal and ice, the cost of handling the latter, and the additional labor required for operating the plant, but there are many locations where the probable practicability is such as to warrant a careful consideration of the matter.

Baltimore & Ohio Relief Department.

The third annual report of this institution for the year ending Sept. 30, 1891, has just been issued. The department has been running, under one form or another, for 11 years. The receipts during the year, in the shape of contributions from members, were $373,487; the balance on hand at the beginning of the year was $299,395, which with other receipts made a total of $678,016. The disbursements were $405,579, including $4,359 "contributions refunded." Unsettled liabilities at the end of the year amounted to about $97,736 and the balance on hand was $184,446. No comparison is made with previous years and there is no explanation of the large decrease in the balance on hand.

The number of members is 22,313, and the total disbursements of the association for the 11 years of its existence have been over $3,000,000. The chairman reports that when new lines are incorporated into the Baltimore & Ohio system the employés gladly avail themselves of the privilege of becoming members.

The pension department now has 185 names on its list and the payments during the fiscal year were $27,894. The total payments to pensioners since the beginning of the plan, Oct. 1, 1884, have been $146,749. This is all paid by the railroad company outright, we believe. The savings bank feature has deposits of nearly $300,000, and outstanding loans of over $400,000. Depositors have received 5 per cent. on their money. The department has erected 21 houses at Brunswick, the new division terminus west of Baltimore, to be sold to employés.

Blank for Record of Casualties.

The proper classification of casualties to persons is a difficult matter on a railroad, for the reason that a complete classification is cumbersome, and to a large extent useless, while one that is too brief offers a constant temptation to change. Besides this, injuries are often hard to classify, from the nature of the case, and the men reporting them have individual views which constantly interfere with the statistician's work. The best classification we have seen is that used on the Pennsylvania lines west of Pittsburgh (and adopted by some other roads), and we give below a description of it, the blank itself being too large for a fac-simile reproduction. Officers interested and who can suggest improvements on this form should criticise it freely, and thus aid in the evolution of a perfect system.

This blank is 23 in. wide, and can be conveniently made with 30, 40 or more horizontal lines. The left side has a column for the number of each item, then there is one for date, name and locality; and then follow 70 narrow columns, headed as indicated below by small italic *letters*. These heads are grouped as shown by the italic *words*, and these groups are gathered under the general heads shown in small capitals.

A.—PASSENGERS.

1. *Where, etc.*—*a.* On passenger trains. *b.* On freight trains. *c.* On station grounds, etc. *d.* Postal and expressmen.
2. *Cause.*—*a.* Collisions. *b.* Getting on and off moving trains. *c.* Getting on and off trains after stop made. *d.* Defective and unlit stations and platforms. *e.* Miscellaneous.
3. *Result.*—*a.* Death. *b.* Loss of limb. *c.* Loss of finger or toe. *d.* Spinal injury. *e.* Fracture or dislocation. *f.* Sprain. *g.* Cuts and bruises. *h.* Miscellaneous.

B.—TRAVELERS ON HIGHWAY.

1. *Where.*—*a.* In vehicles. *b.* On foot.
2. *Cause.*—*a.* Struck on crossing. *b.* Teams frightened. *c.* Defective crossing. *d.* Miscellaneous.
3. *Result.*—*a.* Death. *b.* Loss of limb. *c.* Loss of finger or toe. *d.* Spinal injury. *e.* Fracture or dislocation. *f.* Sprain. *g.* Cuts and bruises. *h.* Miscellaneous.

C.—EMPLOYES.

1. *Employment.*—*a.* Conductors. *b.* Enginemen. *c.* Firemen. *d.* Brakemen. *e.* Mechanics. *f.* Warehousemen. *g.* Laborers. *h.* Miscellaneous.
2. *Cause.*—*a.* Coupling. *b.* Collisions. *c.* Getting on and off trains. *d.* Caught in frogs and switches. *e.* Use of tools and machinery. *f.* Fell from cars. *g.* Defective tools and appliances. *h.* Miscellaneous.
3. *Result.*—*a.* Death. *b.* Loss of limb. *c.* Loss of finger or toe. *d.* Spinal injury. *e.* Fracture or dislocation. *f.* Sprain. *g.* Cuts and bruises. *h.* Miscellaneous.
4. Member of relief association; yes or no.

D.—TRESPASSERS.

1. *Where.*—*a.* On track. *b.* On train. *c.* Miscellaneous.
2. *Result.*—*a.* Death. *b.* Loss of limbs. *c.* Loss of finger or toe. *d.* Spinal injury. *e.* Fracture or dislocation. *f.* Sprain. *g.* Cuts and bruises. *h.* Miscellaneous.

Solar Printing Frame.

The cut shows a solar printing frame made by the Philadelphia Engineering Works, Limited, of Philadelphia, Pa.

The articulated arms carrying the frames are so designed that they may be pushed out of a window, and made to assume any angle. The sash of the window may be lowered to the top of the main arm when the frame is outside and a lid hinged to the window sill thrown up to shut out cold. When the frame is within the room the window may be lowered entirely. The room is not obstructed with tracks and a large frame lying in a horizontal position, as this design may be folded up and placed in a nearly vertical position against the wall.

In order to secure a good blue or other print it is important to have the frame as nearly at right angles to the sun's rays as is possible. Under these conditions a print can be made in considerably less time, and come out clearer and more distinct. The construction of this frame will permit it to be adjusted at right angles to the rays of the sun at any time of day.

The bed frame is made of white pine and covered with a layer of thick felting. The glass cover is hinged to the bed frame on the long edge and secured by means of two oak bars, provided with elliptic springs. With this arrangement the glass may be brought to bear with a light or heavy pressure on the bed. When desired, the bed frame is provided with a double thick plate glass and covered with thick felting. This gives an absolutely level surface, and prevents crimping of the paper. To the bottom of the bed frame is secured a universal bearing provided with a cramping lever. This bearing is mounted upon the end of a jointed lever or arm, which may be supported upon a pivotal column or a strong bracket, firmly secured to the window casing.

The Madison Street Bridge, Chicago.

[WITH AN INSET.]

From the fact that the traffic has increased so materially during the last few years between the north and west sides, and the south side of Chicago it has become necessary to meet these demands by enlarging the driveways and foot walks of the bridges across the river. The main wholesale and retail as well as office portion of the city being situated at the north end of the south side, necessitates a large passenger travel on the bridges for two or three hours, morning and evening, and notwithstanding that there are three tunnels under the control of the cable roads (the third partially completed), a short opening of the draw during a rush hour will produce a blockade of considerable length.

The system by which the draw spans are swung has been reduced to a science. All bridges are connected by telephone to a central office from which the movements of vessels along the river are regulated, and the time for moving boats is restricted as much as possible to certain hours of the day. Vessel captains knowing this, make their plans accordingly, and when the hour arrives (about 6:30 p. m.) all out bound boats calculate to be ready, and a long procession begins, following each other as closely as possible, and as each bridge tender is in communication with the superintendent, and all can work as a unit, the saving in time to the public and shipping is very great. Street bridges are sufficiently high above water to enable tugs and low crafts to pass under, the former by lowering their stacks.

Until recently the river spans have been swung from a pier in the centre of the stream, but of late the plan in several instances has been to locate the main pier on one bank of the river, and build the bridge of sufficient length to reach across to the opposite dock line, thus giving a single broad channel instead of two narrow ones. This wider passage is ample for two moving boats, and at the same time lessens the liabilty of interference by shipping with the bridge fenders, and as in several cases the ground on one side of the river is occupied by railroad tracks, the fact of the superstructure swinging over the cars does not in any way injure the property for its present uses.

The city has erected a four driveway draw span in the centre of the river at Madison street, a new feature of which is the fact that there are but two main trusses, there having been three heretofore, the centre one between the two car tracks. The span is 197 ft. and the width between centres of the trusses 37 ft., outside of which are seven-foot sidewalks, laid with 1½-in. Georgia pine on two courses of well tarred roofing felt, which covers a course of 2-in. surfaced common pine over 4 in. × 14 in. pine joist stringers. The tracks for the car lines are laid with girder rails, the entire driveways being paved with cedar blocks, and having the sides shod with ⅝-in. plates and 3-in. angles.

It is thought best to lay the tracks with a grooved girder rail wherever asphaltum pavements are used instead of the tram-topped rail as here shown, as it prevents broad truck wagons from getting one wheel on a rail and wearing a rut in the pavement opposite. This adoption of a grooved top-girder rail has been advocated by many for general use along the streets, as it would prevent teams using the track as runways ahead of tramcars, and thus causing unnecessary delay to the traveling public, and would also lessen the danger to wagons of having their wheels wrenched off when trying to get out of the track, as frequently happens.

The design of the birdge represents the best recent practice in its general features. The turntable is "rim bearing," being supported on twelve points in its periphery. See Figs. 1 and 2.

The main trusses are each supported over the turntable on two points, resting on two transverse girders, which in turn rest on four sets of bolsters, each set having three points of support on the turntable rim, the points of support on each set of bolsters being so placed as to divide the weight, presumably equally, among the twelve points on the rim. The bolsters are made with curved top chords.

A saving of about three feet in height has been accomplished by setting the main girder down over the secondary girder, having the top flange of the former and the bottom flange of the latter intact and cutting halfway into the plates of each, fastening them securely together and getting sufficient strength by the use of the angles and plates, well riveted on. This reduction of the distance between the bridge floor and the top of the stone pier is an important point as it permits of less vibration in the superstructure when being operated. All struts and top and bottom chords are riveted together and the tension rods have pin connections, the pins as well as the bridge being of steel (with the exception of the ornamental work). All bars, the top and bottom laterals and sway rods are clamped with U bolts and plate, with a separator slipped over the bolt. Open turn buckles of the Cleveland pattern are used throughout. A system of intermediate sway bracing is used in part. No countersunk rivets are used whatever.

There are two steam gear shafts extending down through the lattice work and between the two sides of the lower chords at the ends of the lateral diameter of the turntable, where they connect by a system of gearing with the pinions which work on the outside rack. These pinions and mitres are of aluminum bronze. The hand gear shafts extend down on the horizontal diameter. (See fig. 3 for details.)

The bridge wheels of the turntable are lubricated by screwing an oil cup into the outside end of the short 2-in. axle and cutting a half round groove spirally along the surface of the shaft, inward, with a small drilled hole at the end, fig. 4. Should this become obstructed the inside jam nut may be taken off and a wire run through this groove.

The locking device at the ends of the bridge are an improvement over that generally in use. The latch is kept out by counterweights and has a heavy double freight car spring on either side, so that when it drops

into the pocket the shock due to the swinging bridge is taken by the spring and the two equalizing bring the bridge to a central position. For details of this see plans and elevations as shown in fig. 5.

The floor of the engine-room house is suspended midway between the pavement and the top chords on girders riveted to the main posts. The floor is of 1¼-in. matched maple, laid on concrete, with corrugated iron below, and the house itself has a covering of iron. The machinery above deck consists of a 4½-in. × 2¾-in. × 4-in. duplex pump, supplying two 32-in. boilers, driving a small duplex vertical engine 8 in. × 12 in. (without governor) and connected to the shafting by 26-in. maple faced friction clutchers.

The weight of the bridge is about 375 tons, with turntable, and the cost $52,500, the design being by A. G. Ritter, of the City Engineer's office.

The centre pier is of masonry on a bed of piling driven close together and cut off 14 ft. below the city datum (which is about the water level). These piles are from 25 to 30 ft. in length, and give a substantial foundation. On top of these is laid a 12-in. course of oak, then a 12-in. course of pine laid at right angles, on which is 12 ft. of concrete, then a shell (or ring) of Bedford stone filled in with concrete up to the capstones, on which the metal is set. This work has to be carefully done, allowing chance for proper "setting," and in consequence the work so far has taken considerable time.

There was erected a temporary footbridge across the river, just above the new structure, to avoid inconveniencing the public as much as possible, which consist of a stationary walk to the centre of the river with a draw built up on a flat scow or sandboat. A long plank projected from one end of this flatboat, and was pivoted to a pin at the farther end about which the draw swung. The draw was opened and closed by a hand winch working on a chain which extended between two groups of piles driven close to the abutment, and also in midstream above the pivot. The chain was long enough when opening the draw by pulling on the outer chain to the centre piling to permit the other end to drop to the bottom of the river, allowing boats to pass over it without interference. Although this is undoubtedly a very crude method of handling the traffic, still it has proved very efficient in this case and has been of comparatively small expense both in construction and operation.

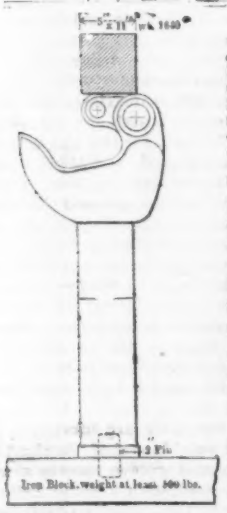
The Strength of Car Couplers of the Master Car Builders' Type.*

CONTINUED FROM PAGE 172, MARCH 4.

In Tables III. and IV. are given the results of drop tests, in which the weight of 1,640 lbs. struck the knuckle in the manner indicated in the cut below. Iron axles, 4¼ in. in diameter at the centre, must stand three blows at 10 ft. and two at 15 ft. from a weight of 1,640 lbs., with supports 3 ft. apart from centre to centre.

TABLE III.—DROP TESTS OF MALLEABLE COUPLERS WITH WROUGHT-IRON KNUCKLES.

Date.	Type	REMARKS.
1891	1. A	Three blows, 10′—One at 15 bent barrel 1½″ out of line, lower lug of knuckle cracked.
1891	2. A	Three blows, 10′—Lower lug of coupler cracked through pin-hole
1891	3. A	Three blows, 10′, five blows, 15—Arm broken by weight glancing from knuckle.
1891	4. A	Three blows, 10′, one at 15—Lower lug of knuckle cracked.
1891	5. A	Three blows, 10′, one at 15—Upper knuckle lug cracked.
1891	6. A	Two blows, 10′, upper knuckle lug cracked.
1891	7. A	Three blows, 15′, cracked coupler arm, knuckle opening reduced from 3 1/16 to 2⅝″, stem broken and back cracked.
1891	8. A	Weight striking arm only; two blows 10′ arm broken off.
1891	9. B	Three blows, 10′, both lugs and most of back broken.
1891	10. C	One blow, 10′, broke tongue of steel knuckle.
1891	11. E	Two blows, 10′, cracked steel knuckle; third blow 10 ft. and one at 15″ broke knuckle.



These drop tests show a wide variation in the strength of the different type of couplers, one kind breaking under the first blow from 10 ft., while others endure the full test for iron axles 4¼ in. diameter. The fractures show also not only the weak points in the design, but the poor quality of the material in both malleable iron and cast steel couplers. The steel bars were evidently made of a grade of steel not suitable for the purpose, and the castings had not been properly annealed. Tensile test pieces made from the same cast as Coupler I had a strength of only 42,000 and 49,000 lbs. per square inch and elongation only 1 and 2 per cent. in 8 ins.

A test of a specimen from another coupler shows that the material is much better adapted to the requirements. It is as follows:

	Not Annealed.	Annealed.
Elastic Limit	48,000 lbs.	43,800 lbs.
Breaking Strain	64,000 lbs.	64,000 lbs.
Elongation	8.25 % (in 4″)	12.5 %
Reduction of Area	11.4 %	21.3 %

* Extracts from a paper read by Mr. Wm. Forsyth, Mechanical Engineer, C., B. & Q., before the Western Railway Club, February meeting.

I have already said enough to show that the M. C. B. coupler as now made is a weak one, both in design and material, and as we cannot change the shape to a strong form without interfering with the standard lines and destroying interchangeability, the only thing that can be done is to make the bar and knuckle of the strongest material possible. The form also requires the coupler to be cast, so the only choice lies between malleable iron and cast steel.

TABLE IV.—DROP TESTS OF STEEL COUPLERS WITH STEEL KNUCKLES.

Date.	Type	
1892	12. F	One blow 10 ft., broke bar back of knuckle.
1892	13. I	Two blows, 10 ft., broke knuckle at pivot pin-hole.
1892	14. D	Three blows, 10 ft., two blows, 15 ft., broke in tongue of knuckle just above pin-hole.

Malleable Iron.—The report on the use of malleable iron in car construction read at the last M. C. B. convention takes up the question as to whether malleable iron is the best material for M. C. B. couplers, and gives a table showing the strength of thick and thin malleable cast iron specimens:

TENSILE TESTS OF MALLEABLE CASTINGS FROM THE NATIONAL MALLEABLE CASTINGS CO., CHICAGO.

C., B. & Q. R. R., AURORA, Ill., May 20, 1891.

Nominal Dimensions.	Actual Dimensions.	Area in sq. in.	Tensile strength. Actual	Tensile strength. Per sq. in.	Per cent. of elongation in 4 in.	Elastic limit. Actual	Elastic limit. Per sq. in.
Ins.	Ins.						
1¼ × ¼	1.52 × .25	.38	13,200	34,760	2	8,000	21,100
1½ × ⅜	1.52 × .39	.593	20,000	33,700	2	9,000	15,200
1½ × ½	1.53 × .5	.765	25,100	32,800	2	13,000	17,000
1½ × ⅝	1.53 × .64	.979	31,400	32,100	2	19,000	19,400
2 × ¾	2 × .78	1.56	39,100	25,100	1½	24,000	15,400
1½ × ⅞	1.54 × .88	1.355	45,500	33,600	1½	26,000	19,200
1 × 1	1.06 × 1.02	1.08	34,000	30,600	1	19,000	17,600
1¼ × 1¼	1.28 × 1.3	1.664	45,600	27,400	1	.....	.....
1½ × 1½	1.52 × 1.54	2.341	66,000	28,200	1½	.....	.....

The figures show a strength of 25,000 to 35,000 lbs. per sq. in. and an elongation of 1 to 2 per cent. in 4 in.

Quite recently the National Malleable Casting Company have made an investigation of the strength of malleable iron castings. I give in Table V. the report of the tests:

TABLE V.—REPORT ON THE TENSILE STRENGTH OF MALLEABLE IRON, SUBMITTED BY D. L. BARNES, JAN. 30, 1892.

No. on sample.	Width.	Thick.	Areas.	Ultimate strength of sample.	Strength in lbs. per sq. in	Remarks.
1	2.70	.247	.6669	21,450	32,163	Edge dressed off.
2	2.69	.252	.6778	21,370	31,528	Edge dressed off.
4	3.04	.263	.7995	25,840	33,524	Sample not prepared.
3	3.04	.368	1.1187	32,000	28,600	Sample not prepared.
5	2.64	.375	.9900	28 100	28,383	Edge dressed off.
6	2.61	.511	1.3490	34,400	25,506	Edge dressed off.
7	2.70	.555	1.4995	33,930	22,642	Sample dressed all sides.
11	3.05	.639	1.9189	55,900	28,683	Sample not prepared.
12	2.64	.652	1.7212	45.720	26.562	Edge dressed off.
14	2.69	.773	2.0793	55,890	26,879	Edge dressed off.
15	2.65	.768	2.0352	52.140	25,614	Edge dressed off.
17	2.66	.516	1.3725	34,620	25,216	Flaw (air hole) br'ke in w'dge
18	2.70	.688	1.8576	45,610	24,553	Sample dressed all sides.
19	2.68	.674	1.8063	41,850	23,159	Sample dressed all sides.
22	2.69	1.021	2.7464	77,500	28,219	Edge dressed off.
23	2.72	1.030	2.8016	73,550	25,895	Edge dressed off.
26	2.68	.248	.6646	20,730	31,191	Edge dressed off.
28	3.00	.561	1.6860	43,750	25,919	Edge not dressed.
31	3.00	.367	1.1010	30,000	27,247	Edge not dressed.
32	2.60	.624	1.6704	43,800	26,221	Edge dressed off.
33	2.68	.516	1.3828	35,840	25,919	Sample dressed all sides.
8	3.00	.519	1.5570	45,450	29,190	Sample not prepared.
25	3.00	.250	.7506	21,770	29.026	Sample not prepared.
30	3.00	.375	.1125	31.400	27,911	Sample not prepared.
45	2.63	.370	.9731	28.200	28,982	

Average of 8 test pieces not prepared for test, 27,870 lbs.
Average of 12 test pieces dressed off edges, 77,786 lbs.
Average of 5 test pieces dressed on all sides, 25,560 lbs.

I took the elongation of Nos. 7, 11 and 18, and found that in 2 and 4 in. the elongation was 1/24 in. This distance was caused by the imperfect fit of broken pieces. This showed there was no elongation in the iron, so I did not make further tests in this direction. The iron, as you will see in returned samples, is not perfect, the internal structure not being homogeneous owing to some fault in the process.

These bars, especially prepared for tests and representing doubtless the best that can be done in malleable castings, show as an average of 25 specimens a tensile strength less than 28,000 lbs., and practically no elongation. Measured by such figures, we must conclude that malleable iron does not possess sufficient strength and ductility to make it the best material for the severe service of the M. C. B. coupler.

Steel Castings.—Steel castings, when properly made, possess a strength greater than wrought iron and a ductility nearly equal to it. The irregular character of many steel casting made heretofore has given it a bad reputation, but the sound part of a steel casting is so superior in strength and ductility to any other kind of casting that the best efforts of our metallurgists have been directed to the problem of the production of sound steel castings, and as a result the quality of the latter is gradually improving. I believe that finally the process will be so improved, molds and foundry manipulations so well understood and the workmen so skillfully educated that absolute reliance can be placed on the product.

The tensile resistance of the couplers tested did not show the superior strength to be expected from this material, but when properly made I believe there is a better prospect of getting strong couplers, made of a material which in repeated tests has shown a strength of 60,000 to 70,000 lbs., and an elongation of 15 per cent. to 20 per cent. in 8 in., than from one which will not average over 30,000 lbs. with practically no elongation. In Table VI. are given the results of official tests of steel castings made by the United States Government.

In making a specification for testing M. C. B. couplers I should place the figures for tensile strength of the material about as high as any bar has been found to endure, for I think the competition among coupler makers will soon result in the production of a stronger bar than they are now making, if the stronger bar is demanded by the railroad companies. I would require them to endure a pulling load of 125,000 lbs., and in time this could probably be raised to 150,000 lbs. For the drop test I would require the same kind and number of blows as are given M. C. B. 40,000 lb. iron axles, two couplers out of each 200 to be tested in the tensile machine and the one remaining unbroken to be tested under the drop.

TABLE VI.—U. S. GOVERNMENT TESTS OF STEEL CASTINGS.

Tensile strength per sq. inch.	Elastic limit per sq. inch.	Elongation.	Reduction of area.
71,200	36,000	15 × 8″ Section.	16.32
64,000	36,400	23 × 2″ "	30.57
71,000	37,500	22 × 2″ "	39.49
73,000	38,000	25 × 2″ "	27.86
79,000	36,5 0	15 × 8″ "	23 75
77,500	38,500	20 × 2″ "	49.66
65,000	38,000	25 × 2″ "	28.87
68,000	36,700	19 × 2″ "	22 05
67,000	36,000	20 × 8″ "	16.50
70,000	37,500	18 × 8″ "	23.20

Proposed Specifications for Strength of M. C. B. Couplers.

Two sample couplers, selected from each lot of 200, when tested for tensile resistance must not break under a load of 125,000 lbs.

The coupler remaining sound must endure a drop test of 1,640 lbs.—three blows falling 10 ft. and two blows falling 15 ft., the die striking the knuckle as shown in fig. 2; the tail of bar to rest on a solid block of iron weighing not less than 500 lbs.

A test bar, made from the same cast as the coupler, or cut from a coupler, must have a tensile strength 60,000 to 70,000 lbs., and an elongation of 15 to 20 per cent. in 4 in. or 10 to 15 per cent. in 8 in.

Conclusions.—The breakage of M. C. B. couplers can be largely reduced:

1st. By protecting them with buffers.

2d. By making them of cast steel.

3d. By purchasing, subject to inspection, by the tests proposed.

Foreign Railroad Notes.

Mr. O. W. Petri, engineer attaché of the German Embassy in Washington, has contributed to the German *Organ of Railroad Progress* an essay on the increase in car capacity and train-loads and their influence on the working expenses of American railroads. Mr. Petri goes into considerable detail, gives statistics of the reported rates received and cost of transportation per ton per mile for a series of years on some of our railroads, showing how great the decrease has been, and also of average car-load and train-load, etc., on a number of different railroads, whose average train-loads vary from 92 tons on the Richmond & Danville to 285 on the Pennsylvania Railroad, showing that they have a pretty close relation to the density of the freight traffic. He illustrates his study of statistics by diagrams which show very clearly the expenses per ton-mile under four heads for each railroad considered, and how the expenses for "conducting transportation" particularly decrease with the increase of the train loads, though the decrease is very moderate when once a train-load of as much as 200 tons has been reached. The article discusses the influence of increased car capacity on train resistance, as affected by the reduced proportion of dead weight, by the difference in journal friction, by side winds and by curve resistances; the effect on maintenance of car expenses, on station and accounting expenses and on switching. He also investigates the disadvantages of large cars, as the greater difficulty of switching cars without a locomotive, changes required in turn-tables and and other station appliances, and the effect of heavier load per wheel on superstructure.

Mr. Petri also contributes to the *Archiv fur Eisenbahnwesen* an article, "Passenger Trains with Numbered Seats on American Railroads,"—that is, trains of drawing-room and sleeping cars. He adduces some statistics concerning the proportion of seats occupied in such cars which are not generally known, and he is inclined to favor the introduction of such cars on many German lines, where they might take the place of the unprofitable first-class cars; or the latter might be transformed into what we call drawing-room cars. He thinks the numbering of the places is essential to their success.

The estimates of the Prussian State Railroads for the year ending with March, 1893, provide for the entry into the service during that year of no less than 7,704 regular permanently appointed employés, although it contemplates the addition of only 155 miles of railroad meanwhile. This is said to be largely because the number is calculated for the times of greatest activity of traffic, while heretofore it has been made for the season when traffic is lightest. But it is also intended to increase the force at stations, and make the supervision more minute, so as to promote safety and expedition. It is probable that this increase of the regular staff will permit a reduction of the force engaged by the day, which is a very large part of the whole, which can be discharged when not needed, while the regular force is substantially engaged for life. Only 14 of the places to be filled are what would be called "officers" here; but there are provided in the list 56 station-masters, 756 "station foremen and assistants," 65 shipping and receiving clerks, 718 locomotive engineers, 230 conductors, 777 firemen, etc. All this indicates that the employés are not to be so hard pressed as formerly.

In Austria a general order of the Ministry of Commerce required that all rebates and drawbacks allowed shippers

by the railroads should be published in the official railroad journal. This order was issued in March, 1879, but in the following December a supplementary order authorized the appropriate bureau of the Ministry to allow secret rebates in cases where the publication of them might injure the Austrian lines competing with foreign railroads. These secret rebates were strongly objected to by the German railroads, and by the recent treaty of commerce it has been agreed to put an end to them.

Last July the French railroad companies complained to the Minister of Public Works of the extraordinary amount of traveling by the inspecting officers of the ministry, who travel on free passes. An investigation was made, when it appeared that besides the passes issued by the ministry, a number of others, of similar form, were in circulation. The counterfeit passes were sold by the counterfeiter for from $100 to $180 to people who had frequent occasion to travel. A former employé in the ministry, who had had the counterfeit passes made, was arrested, and also several persons who had bought and used them. They are to be tried by a criminal court.

On the chief Turkish railroad, 508 miles long, in 1890, 2,319,954 passengers were carried and only 377,072 tons of freight. The average haul of the latter was 134 miles, making an average movement for the year of 98,340 tons per mile of road, equal to 135 tons each way daily.

The Prussian Ministry of Public Works has directed that some lectures on the applications of electricity to railroads be added to the special courses of lectures on railroad matters given in various universities, etc., for the instruction of the higher railroad officers.

The estimates for the expenditures of the Prussian state railroads for the coming year (beginning March 1,) include appropriations for 404 new locomotives and 3,933 baggage and freight cars, and the average estimated cost is $10,241 per locomotive, and $763 per car. These cars doubtless will have the newly adopted capacity of 12½ kilometric tons, or 27,500 lbs. In proportion to capacity, therefore, they are very much more costly than our freight cars.

The Canda Draft Gear.

Figs. 1 to 6 show in detail the drawbar stop of the Canda draft gear and figs. 7 and 8 show how this gear is arranged and applied to the Canda cattle cars. The drawbar stops are made of malleable iron in four main parts with two malleable iron followers. The sides or stops interlock with the top and bottom plates, forming substantially a solid spring case, secured to the sills by lateral bolts as shown and in such a manner that the bottom can be removed and the coupler with strap end and draft spring can be dropped down without removing the sides or top and without detaching the gear from the sills. This is an important advantage and one that will be appreciated by those who make repairs, as the device has been designed with the intention of increasing the durability and strength and reducing the repairs to a minimum. To this end malleable iron is used and the weights of all parts are as small as possible consistent with the necessary resistance to shocks and blows. Tests of this gear show that it can be knocked from under a car and the sills splintered without injury to the gear. The sides and top are interlocked so that both sides receive the blows regardless of the position of the draft spring when closed up. That is if the draft spring is longer on one side than the other the blows are not all taken by one side stop, but by both equally. Altogether, this is one of the best draft gears for wooden car sills that has been brought out for some time; this is, of course, taking into consideration its advantages of compactness, ultimate strength, lightness and facility of repairs.

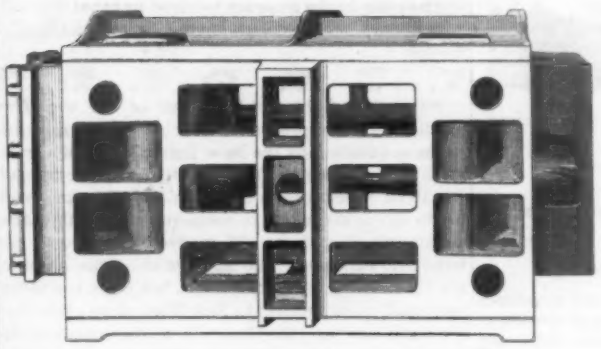
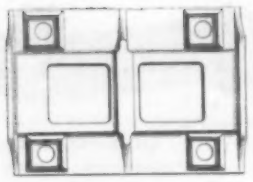


Fig. 1.



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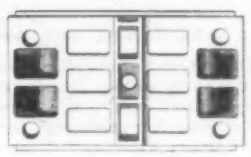

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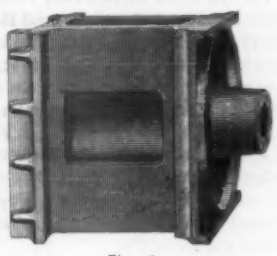

Fig. 2.

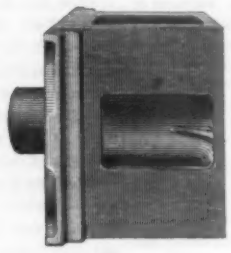

Fig. 3.

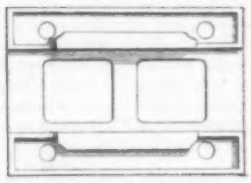

Fig. 6.

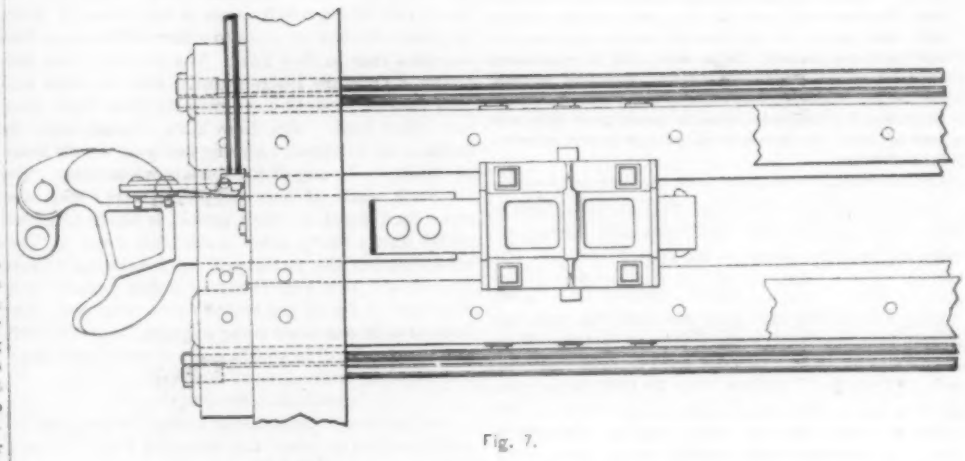

Fig. 7.

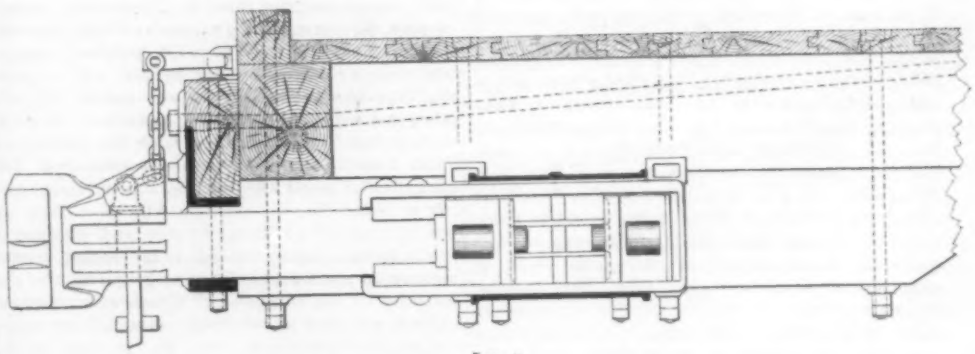

Fig. 8.

THE CANDA DRAFT GEAR.

North Carolina Railroad Commissioners' Report.

The annual report of the North Carolina Railroad Commission has just been completed. The length of road in the state is 3,482 miles, and the taxable property of the companies is assessed at $18,423,298, an increase of six millions over the previous year. The capital stock and debt apportioned to North Carolina is 75 millions, and the gross earnings in the state for the year ending June 30 were $8,651,625.

The Commissioners made a careful investigation of the disaster at Bostian's bridge (Statesville), Aug. 27, but the law does not say what further action the board shall take, and "as the responsibility for the accident is to be judicially determined" no opinion is expressed in the report.

TECHNICAL.

The Mesaba Iron Range.

Ever since the discovery of iron on the Vermillion range in Northern Minnesota, cruisers and mineral experts have scoured the northern part of that state in search of other bodies of ore. In order to develop the Vermillion range and to market the ore from it, the Duluth & Iron Range Railroad was built, and the Minnesota Iron Co. obtained control of a large portion of the mines and mineral lands on that range; the same company practically controls the railroad. Iron was discovered on the Mesaba (Giants) range in 1890, when a survey was being made for a projected railroad to extend from Duluth into Manitoba. The engineers, in running this line, came upon the track of a storm which had uprooted a large number of trees, and iron ore was discovered in the openings thus made in the soil. The capitalists who were behind the road then explored the country surrounding these discoveries, and obtained control of many thousands of acres of land. They have since that time sunk a large number of test pits, and several of the mines, the Biwabik, Mountain, Iron, Kenawha, Cincinnati and others, are already in shape to ship ore. Of course, the excitement spread, and as soon as it was known that iron had been found there was the usual scramble to get the land. This excitement is fast reaching a fever heat, and mining companies are being organized by the dozens. In order to market this ore a considerable amount of railroad building is necessary. Contracts for constructing the line of the Duluth, Mesaba & Northern have been let and the work is already well under way. The Duluth & Iron Range is likely to build a branch to the east end of the range, and the Duluth & Winnipeg will build one or more branches to tap the west end. It is now announced that the Duluth, Red Lake Falls & Northern is securing a right of way for an independent line, 100 miles in length, from Duluth to the Mesaba range. It is quite probable that three roads will reach the new field, and possibly four.

Nearly all of the ore disclosed so far is hematite and the following analysis of samples, taken from pits on the eastern end of the range, show the high grade of the ore:

	No. 1.	No. 2.	No. 3.
Iron	60.76	62.56	64.75
Manganese	.51	.38	.67
Silica	10.86	8.47	6.08
Phosphorus	.016	.017	.015
Aluminum	1.35	1.12	.69
*Lime	....	....	....
Magnesia	.37	.14	.09
†Sulphur	....	....	....
†Titanium	....	....	....
Oxygen and volatile matter	26 06	26.82	27.74

* Trace. † Absent.

It is probable that these discoveries and developments will result in the establishment of extensive manufactories of iron and steel at the head of Lake Superior.

There has been received by the State Treasurer the following revenue from the mineral lands on the Mesaba range, and for filing articles of incorporation of iron mining companies. Mineral leases, 40 acres each, cost $25, and a royalty of 25 cents for each ton of ore shipped and run for 20 years. Contracts, limit 50 years, cost $100 per year. Contracts and mineral leases for the year ending July 31, 1891, were $9,975, and from July 31 to and including March 7, 1892, $12,150; for filing charters of iron mining companies, year ending July 31, 1891, $1,450, and from July 31 to March 7, $56,125. A comparison of these figures affords some idea of the interest taken in this new iron field.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in his journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in considerationof advertising patronage.*

The grain receipts at the four Atlantic ports, Boston, New York, Philadelphia and Baltimore, during the calendar year have been, in *millions* of bushels:

1885.	1886.	1887.	1888.	1889.	1890.	1891.
217.0	227.0	222.7	182.9	203.7	234.5	263.7

Only half of the last year was good, the first half having been unusually unfavorable, on account of the light crops of 1890. Yet the total receipts last year were 12½ per cent. greater than in 1890, 30 per cent. greater than in 1889, 44 per cent, greater than in 1888.

The proportion as well as the quantity arriving in New York last year was unusually large, being nearly 60 per cent. of the receipts of the four ports, against 52 per cent. the year before. This, however, is to some extent the result of the larger exports, for Philadelphia and Boston receive chiefly for home consumption, which varies little with the crops. However, Baltimore also received about 9 per cent. *less* grain last year than the year before, and Philadelphia 17 per cent. less, while Boston gained 7 per cent. and New York 29 per cent. Or, putting it into quantities, New York gained 35¾ million bushels and Boston 2½, while Philadelphia lost 5½ and Baltimore 3⅜. There was no such revolution in the course of the grain trade as might be supposed to cause this. The increase in the grain traffic was very largely due to a great increase in the production of spring wheat, which is always marketed chiefly at the northern ports. The southern ports have an opportunity to take their revenge in the corn crop now coming forward, which comes largely from a territory closely connected with those ports. Indeed they evidently are taking it, for while for the whole year 1891 Baltimore received 3⅜ million bushels *less* than in 1890, in the single month of January this year it received 4⅝ millions *more* than last year, and Philadelphia also 4⅓ millions more, and together more than four times as much as last year, New York gaining 132 per cent., and a less quantity than the other two ports. The aggregate January receipts of the four ports were nearly three times as great as last year, and one-fourth more than in 1890, after a corn crop larger even than that of last year. Other signs of the movement of the corn crop, which usually attains its maximum after navigation opens, in May and June, are seen in the great increase in earnings of great corn carriers like the Chicago, Burlington & Quincy, the Rock Island and the Atchison, which very likely will be still more notable in some later months.

The total grain receipts of New York for the last seven calendar years have been, in millions of bushels:

1885.	1886.	1887.	1888.	1889.	1890.	1891.
126.6	130.9	127.5	103.1	112.6	122.0	157.9

The gain last year over 1890 was thus 29 per cent., and over 1889 no less than 40 per cent. While the total income over 1890 was thus nearly 36 million bushels, the increase in the quantity received by canal was only 1½ millions, canal receipts having been, in millions of bushels:

1885.	1886.	1887.	1888.	1889.	1890.	1891.
31.0	45.5	37.4	34.0	34.0	30.2	31.7

We shall probably not be far out of the way if we ascribe the larger proportion carried by the railroads to the acquisition by the New York Central of a great stock of modern powe. ful locomotives capable of hauling about 40,000 bushels in a train, which make it willing to accept shipments in competition with the canal at rates which with its old motive power would not have paid expenses. The Erie (which was ahead of the Central with such equipment. but has a less favorable road) alone brought to New York more grain than the canal last year, the Central a ninth more, and the New York Central and the West Shore together nearly twice as much. Next to these comes the latest competitor, the Lehigh Valley, which carried over 18,000,000 bushels, more than a ninth of the whole, and three and one-half times as much as the Lackawanna, which has had a Buffalo line much longer; indicating that the former was willing to carry at rates which were not satisfactory to the latter. Doubtless much the larger part of this grain movement was in the last four months of the year, when rates were profitable to all; but before for four months the canal probably could have carried pretty much all that came by way of Buffalo, and the railroads had to meet canal rates to get any grain from that port.

The Pennsylvania is comparatively not a very important feeder of the New York grain trade, and the larger part credited to it comes in the form of flour, It carries much more grain to either Baltimore or Philadelphia than to New York. The receipts by the Baltimore & Ohio are insignificant. Both in 1889 and 1890 the Erie brought more grain to New York than any other road. The New York Central takes its position at a bound, carrying last year nearly twice as much as in any of the three previous years. The immense stock of corn in the country, with also more than usual of other grains, is likely to afford all the lines a heavy grain traffic this year, at least until after harvest, and it will be interesting to note whether the New York Central will gain greatly over the record of a year one half of which was bad. The amount to be marketed being so great, it is probable that the canal will be able to make a substantial gain, instead of the trifling one of last year.

The Cincinnati, Hamilton & Dayton, which has recently decided to adopt the Standard Code of train rules, has promulgated them in a somewhat unusual manner, the first step being to issue a circular, announcing the adoption of Rules 96 to 103, inclusive, together with certain rules concerning signals, with a notice that later circulars will be issued, putting in force other portions of the code. The intention is to divide the code into three parts, and issue the instructions about a month apart. General Superintendent Neilson's circular issued with the first announcement says: "It is hoped that the employés will show their appreciation of this additional trouble and expense, to enable them to master the code in the easiest possible manner, by a strict compliance with, and faithful performance of, the instructions." Whether the additional expense will prove to have been warranted, we cannot say, for it is conceivable that the issuance of the whole code, a month or two before putting it in effect, as has been done by some roads, would, with sufficient care, accomplish the same results; but there is one decided advantage in the C. H. & D. plan, and that is, that the men will learn, unmistakably, that the company desires and intends that they shall thoroughly learn each and all of the rules; which is more than can be fairly said of some roads which have changed their codes. There are cases where the issuing of the new has been done in such a manner that the employés could clearly see that the old spirit, which depended too much upon the printed rule instead of upon a certain knowledge that every trainman understood it, still governed in the superintendent's office.

To properly catechise a man on the 148 rules of the standard code, and do it all at one sitting, is a somewhat tedious process, and the average trainmaster is quite likely to try to shorten it if he thinks he can do so safely. To examine a number of men at once fails to wholly remove the difficulty and at the same time introduces new ones. And as the answers given by an intelligent man to a few of the more important questions will generally make the trainmaster *almost* sure how the same man would answer many of the others the temptation to decide that a condensation of the catechising process will be perfectly safe is very strong. But it needs but little reflection on the lessons of past experience to remind one that misapprehension of almost any one of the rules may cause appreciable damage, if not pronounced disaster, and the only way the trainmaster can "take the safe course," which he is enjoining upon others, is to lengthen the hours of his instruction class rather than shorten them. There is room for a well prepared lecture on every page-full of rules in the code, and on many single rules. We are not sure but the road above mentioned will do well to call up its men six times instead of three. Probably many of the rules will be discussed more than six times in the roundhouses and lobbies; and everyone knows that these discussions *ought* to be conducted in the superintendent's office; though it is not so easy to decide just how to bring that about.

Locomotive Boilers.

In our issue of Jan. 22 appeared two papers on locomotive boilers and their construction, one of which will be of much value to the student of the details of boiler construction and to all who have to do with boiler repairs. The other was more speculative, but will be especially interesting to those who are still in doubt as to the relative value of the Belpaire and radial-stay types of locomotive boiler, and, indeed, both papers are valuable from this standpoint. What Mr. Speirs said about the radial stay boiler accords exactly with what has been said in these columns. It is evident that with the mass of stays in the Belpaire type such boilers are not as useful with bad feed waters as with good. Mr. Dean's argument about the mathematical exactness with which stresses in a Belpaire boiler can be determined is not carried out to demonstration. The fact is that in any boiler stresses cannot be calculated with exactness, and invariably boilermakers allow a little more material "for luck," which covers the great uncertainty as to the stresses in any boiler, and more particularly in those of the locomotive type.

The practical points brought out by these papers are of considerable value. The information given by Mr. Speirs has been gathered during a long and varied experience with boiler work of different kinds. This paper is one of a sort which illustrates well the value of a railroad club to its members, for without a club, and therefore the incentive, many such papers would probably not be written and the valuable experience would go unrecorded.

Mr. Dean's paper was written from the standpoint of a boiler designer rather than that of a builder of boilers, and it offers several valuable suggestions. In recommending the elastic limit of the material instead of the ultimate strength as a basis for a factor of safety he agrees with others in this country, who maintain that this is the only safe practice; but all our present rules, tables and experience are based upon ultimate strength. It is true that it is unsafe to exceed repeatedly the elastic limit of the material in a boiler, yet a boiler will not explode until after that limit has been passed. It is, however, unsafe to subject a boiler to such a strain continually, as the material will become "fatigued" and is thereafter liable to rupture at a lower pressure than would strain it to its ultimate strength. Practically what everybody does now is to take the elastic limit into consideration, for all good specifications for boiler material specify both the elastic limit and the ultimate strength. Hence if the specifications are conformed to, there is, indirectly of course, full consideration of the elastic limit of the material. To change the factor of safety to correspond with the elastic limit would be merely to divide it by the ratio of the elastic limit to the ultimate strength. What is doing in the way of boiler design is all right whether or not we consider more particularly the elastic limit or the ultimate strength, if, as is the case in modern specifications, both factors are considered, and, as we understand it, Mr. Dean does not recommend anything else, but would lay especial stress upon the elastic limit rather than upon the ultimate strength.

One must admit that the argument offered regardt ing circulation in locomotive boilers is largely speculative. The fact is little is known about it. It is supposed by some that the average locomotive boiler has the parts arranged in a bad way to get good circulation; yet no one has proved it, and in fact there is little or no evidence of bad arrangement in the effect of the fire on the sheets. We all know that in corrugated furnaces when used with forced draft the intense flame against the firebox sheets brought about by the air being driven through the crevices between the grate bars and the side sheets causes a superheating of the material, due undoubtedly to the separation of the water from the sheet by the intense heat generated. But this is under conditions never found in a locomotive boiler except perhaps at the surface of the fire. The crown sheet and side sheets, which are the points at which the circulation is disputed, are not heated to

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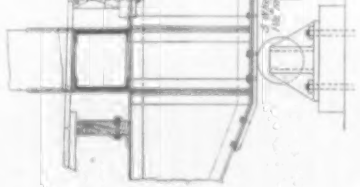
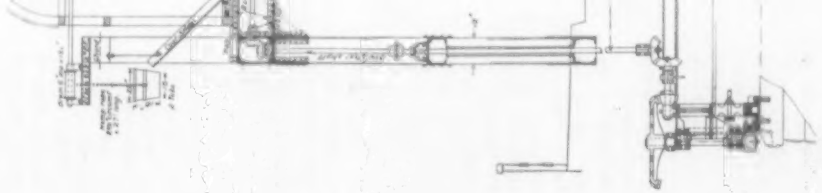
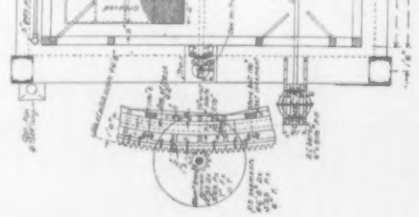
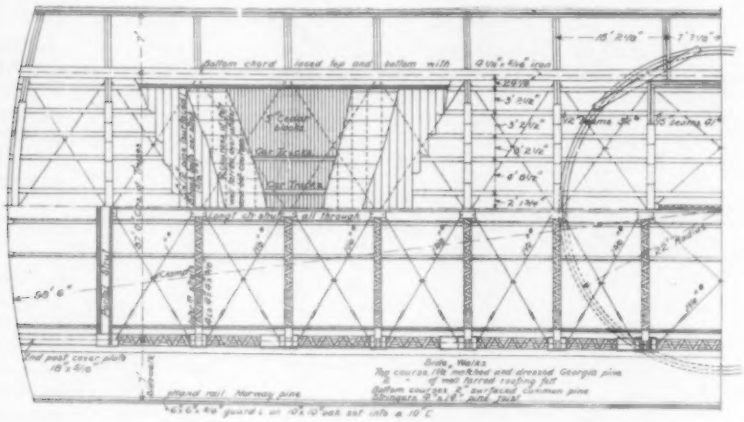
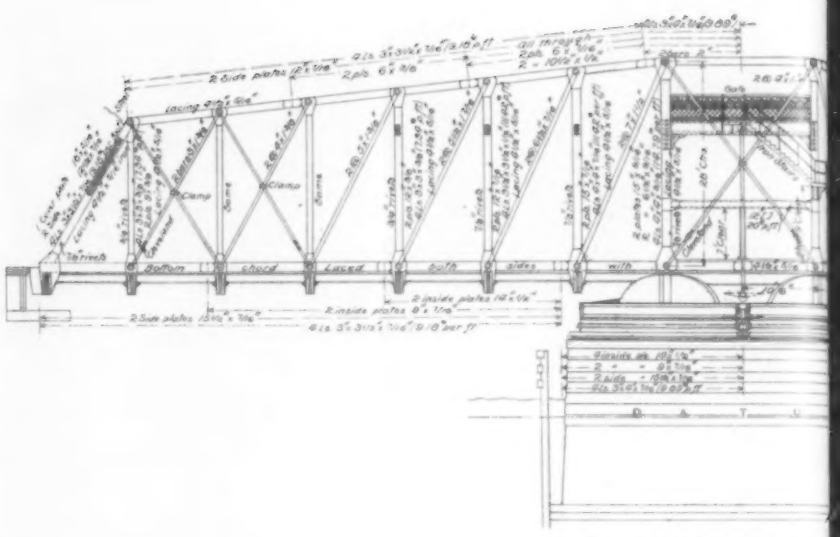




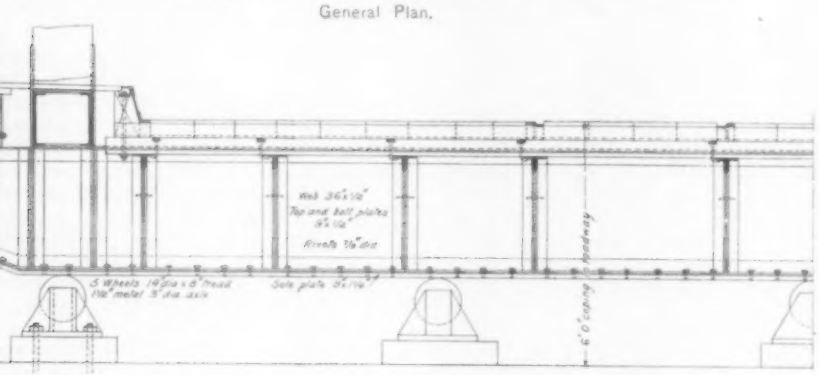




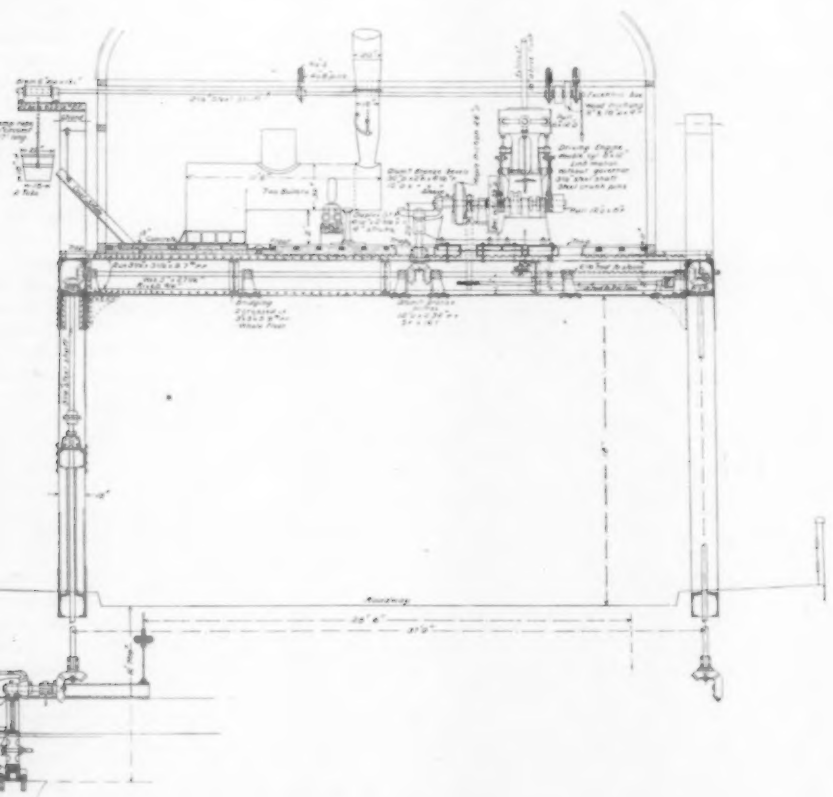
General Plan.



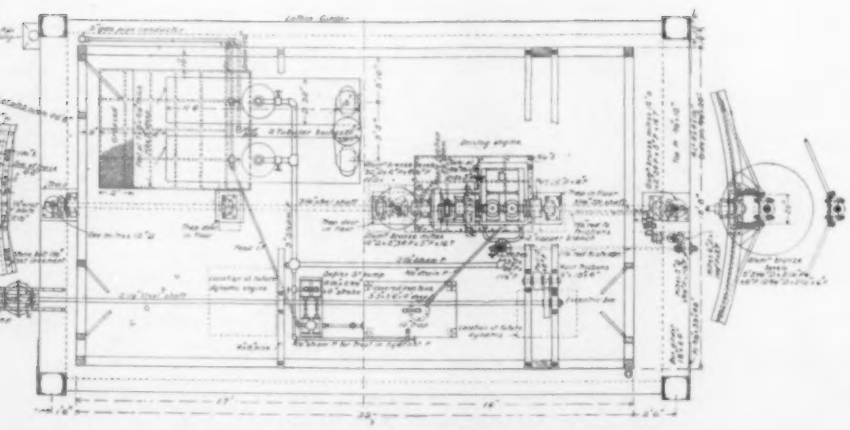
General Elevation.



End View of Floor System.



Section through Engine House.



Plan of Machinery in Engine House.

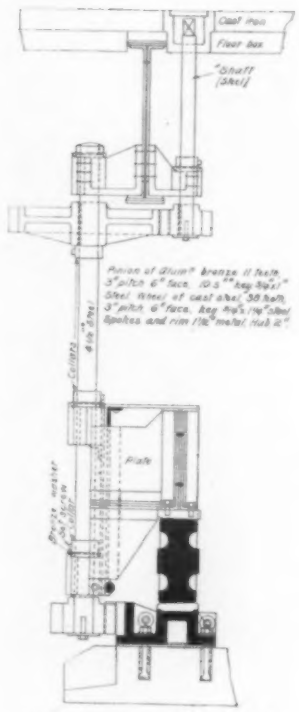
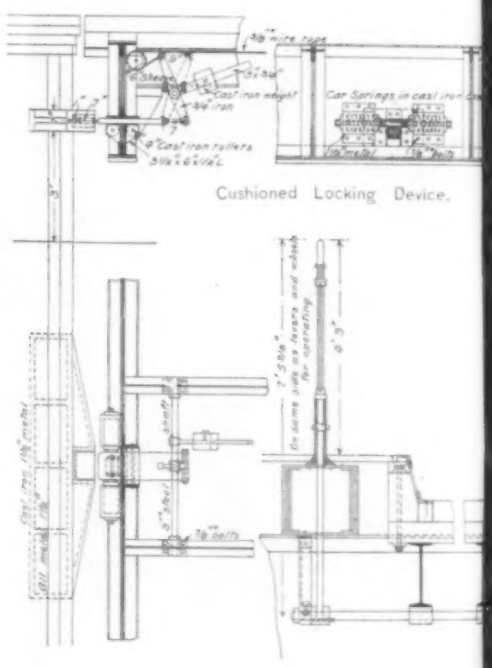


Fig. 3—Pinion Connection for Hand Gears.



Cushioned Locking Device.

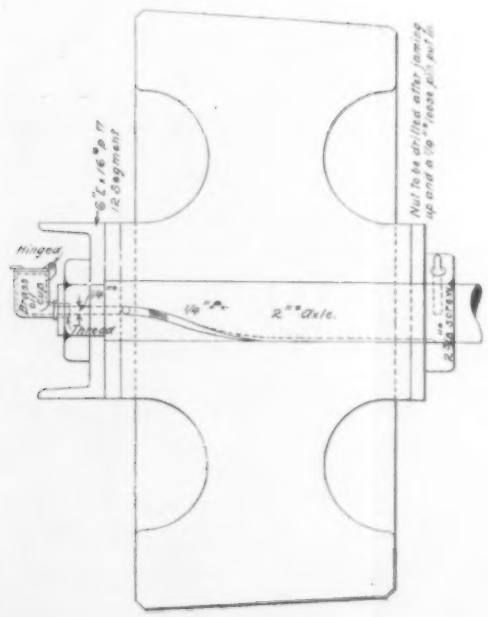
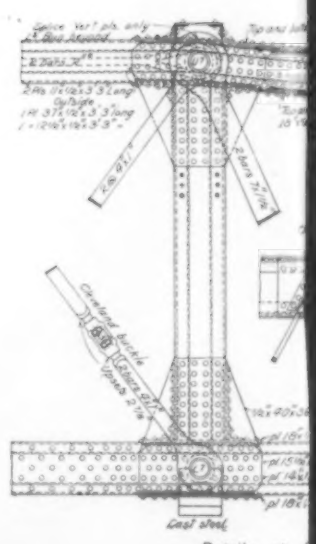
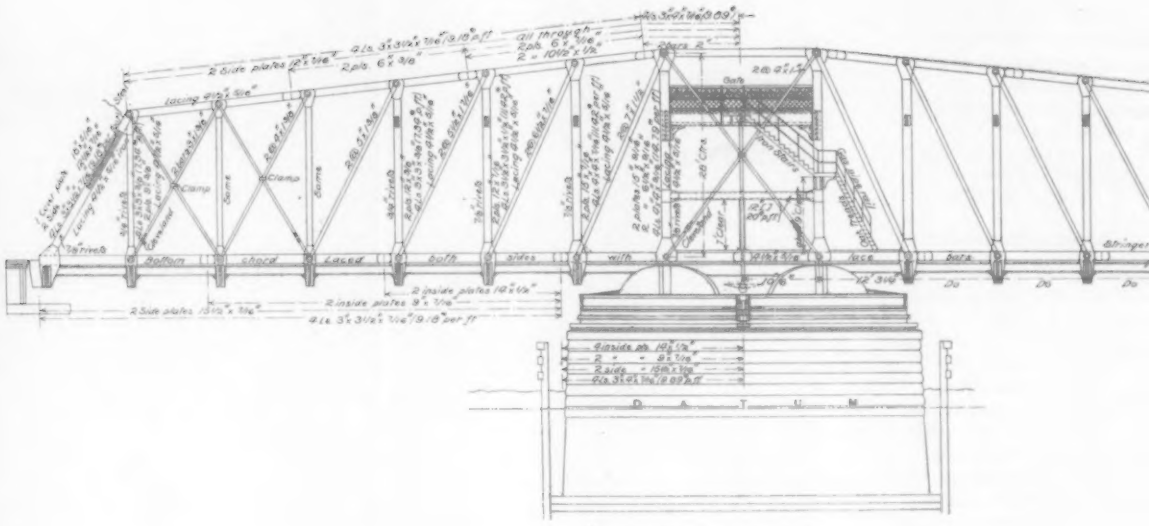


Fig. 4—Bridge Wheel.



Details at

GENERAL ELEVATION AND DETAILS OF THE MADISON STREET



General Elevation.

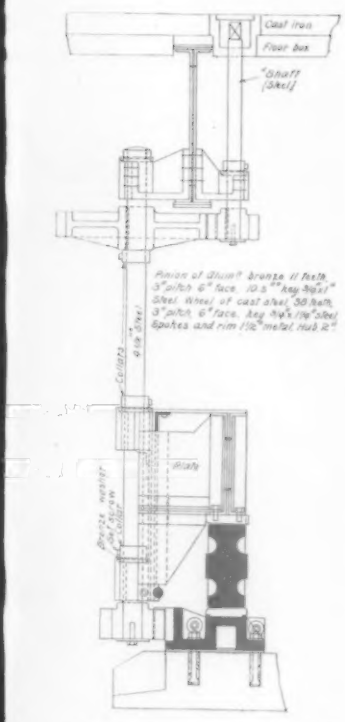


Fig. 3—Pinion Connection for Hand Gears.

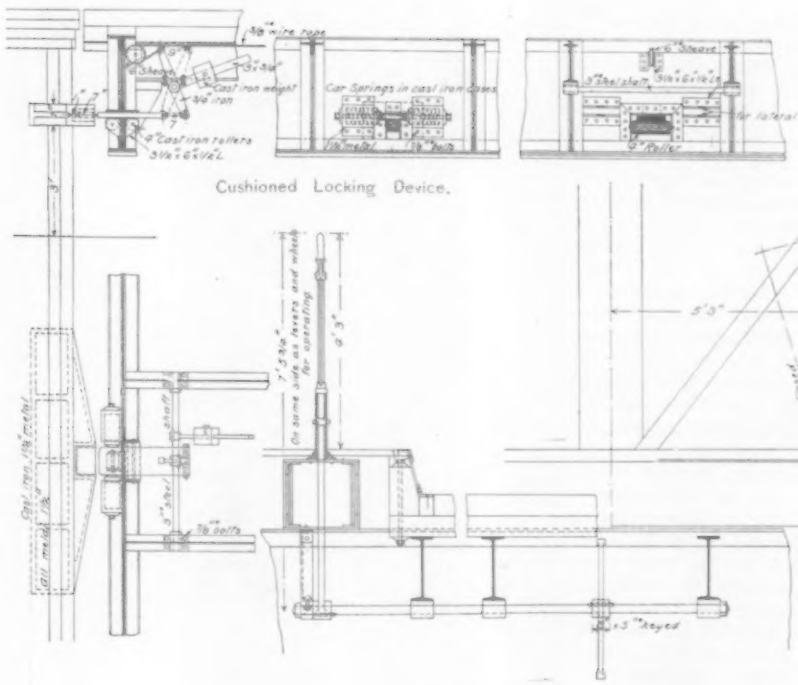


Fig. 5.

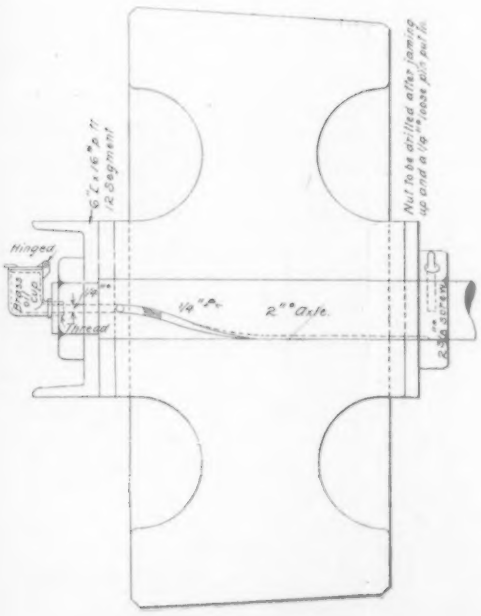
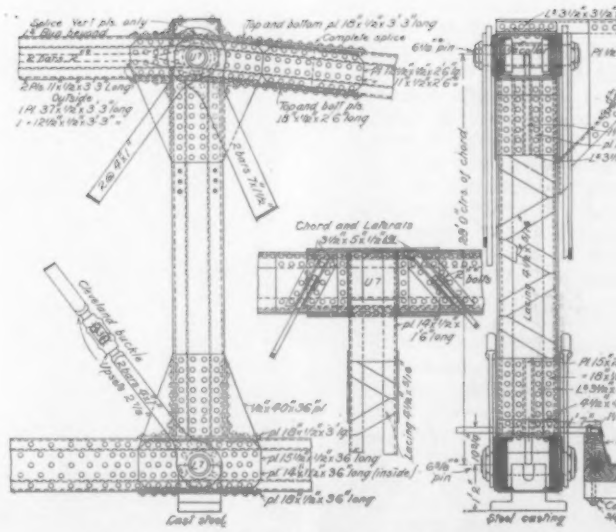
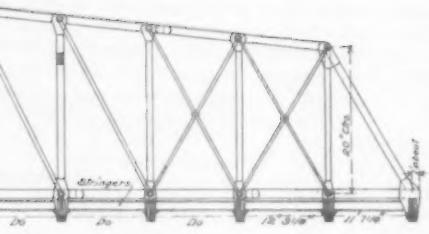


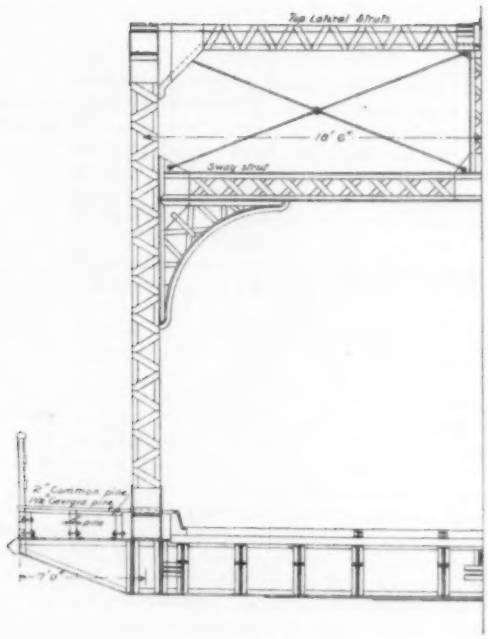
Fig. 1—Bridge Wheel.



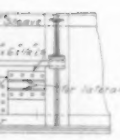
Details at Panel Points—Top and Bottom.

GENERAL ELEVATION AND DETAILS OF THE MADISON STREET DRAWBRIDGE, CHICAGO, ILL.

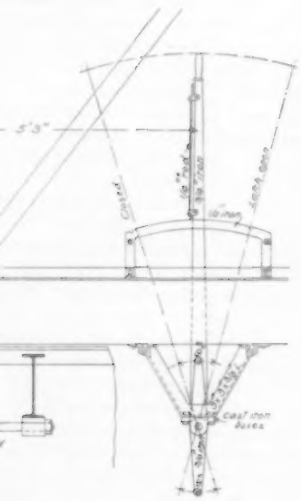




Cross Section.



for lateral connection



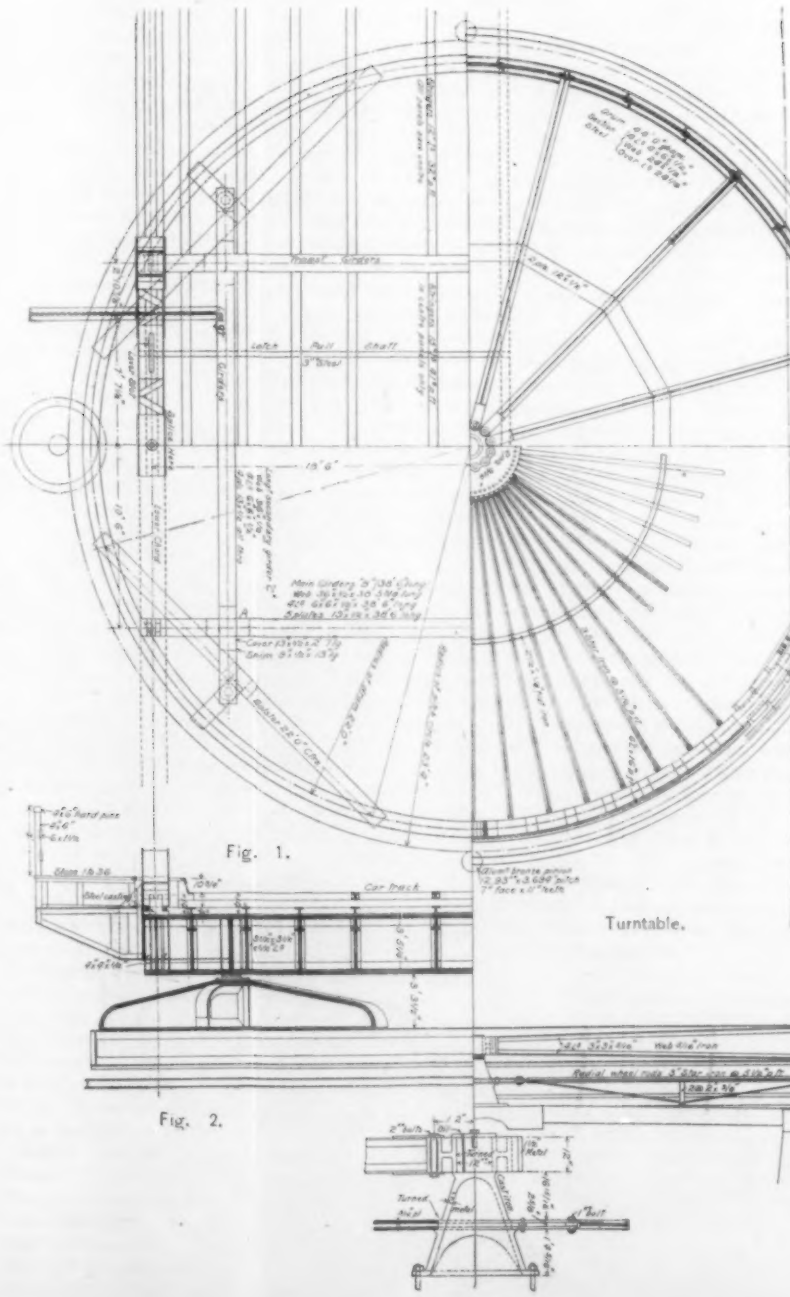
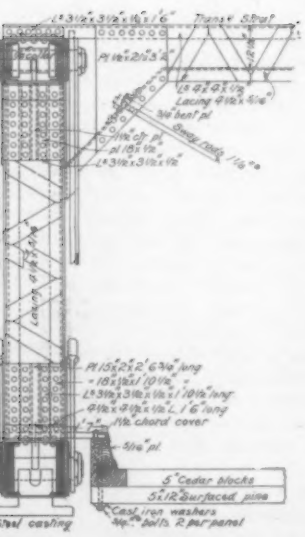


Fig. 1.

Turntable.



nd Bottom.

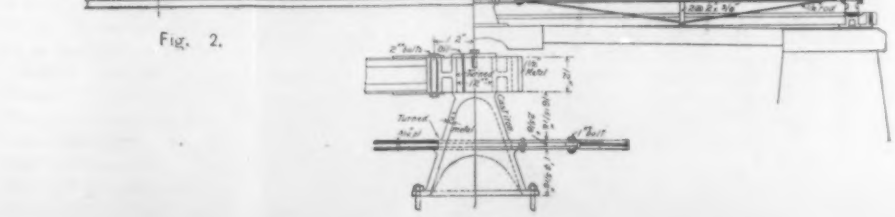


Fig. 2.

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any such extent as in the marine boiler furnace just cited. There is no doubt but some forms of crown bar boilers have what is apparently a badly obstructed circulation when compared with the radial stay and Belpaire types, but this may only be comparative, and the circulation may be good enough for all practical purposes in either type.

Reduced Profits of the Prussian State Railroads.

The report of the Prussian State railroads for the year ending with March, 1891, submitted to the Diet by the Minister of Public Works recently, gives the results of the operation of 15,384 miles of standard gauge railroads worked at the close of that year, which was 606 miles more than at the beginning. Besides these roads the State has 68 miles of narrow gauge branches in the mining district of Upper Silesia and 121 miles of other lines not open to the public.

The capital expended for the system reporting had been $1,512,489,945, or $98,316 per mile of road. The gross earnings for the year, which were 2.9 per cent. greater than the year before, amounted to $211,490,936. Per mile of road they were $13,747 and 1.6 per cent. less than the year before. The working expenses were $131,537,786, and no less than $18,584,665, or 16.4 per cent. more than the year before, amounting to $8,550 per mile of road. The expenses for wages and salaries increased 12.8 per cent. and those for materials 19.4 per cent.

The net earnings accordingly were $79,953,150, which is $12,492,905, or 13½ per cent. less than in the previous year, and $5,197 per mile of road. This is an important decrease in income even for a state as large as Prussia. The net earnings, which yielded 6.26 per cent. on the capital invested in 1889-90, were only 5.26 per cent. last year. From the profits of previous years about $170,000,000 of this capital had been retired, and on the capital now outstanding the net earnings of last year were 5.93 per cent., which is much more than the state has to expend as interest on the securities it has issued to pay for its railroad system. This system has not ceased to be profitable, therefore, but the great decrease in its profits, and that in a year when traffic increased, is of considerable importance in a country where it is not too easy to provide revenue for the necessarily large national expenditures.

The year 1889-90 was one of extraordinary traffic, but in passenger earnings there was a further increase of 7.7 per cent. last year. It is noticeable that the fourth-class travel made great gains, yielding 15 per cent. more than the year before, which indicates a state of comparative prosperity in the very lowest classes. Third-class earnings increased 4 per cent., second-class nearly 6, first-class only 1½ per cent. The whole number of passenger journeys increased 16¾ per cent., the third-class journeys increasing no less than 26 per cent. The aggregate passenger mileage increased 12 per cent., the increase in travel having been mostly in short journeys. Nearly all the fourth-class trips are short, as may be judged by the average receipt from the fourth-class passenger, which was 13.2 cents. The passenger earnings were a little more than one-fourth of the total gross earnings, which is nearly the same proportion as in this country. The increase in these earnings was about five-eighths of the total increase in gross earnings in Prussia. The travel was at the rate of a movement of 416 passengers each way daily over the whole system (against 104 in the United States). The travel in Prussia was equivalent to an average journey of 164 miles per inhabitant; in the United States, 190 miles. But the average Prussian paid $1.93 for his year's railroad traveling; the average American, $4.17.

The freight earnings on the Prussian state railroads increased only one per cent. in 1890-91. The ton-mileage is not now reported. There were 1,615,182 tons of live stock carried, and 58,494,216 tons (kilometric) of coal, the latter being about one-fourth more than our anthracite shipments. The earnings from coal averaged about 80 cents per ton. The total freight earnings per inhabitant were $5.16 in Prussia against $11.43 in this country. The amount of transportation per inhabitant is immensely greater in this country, but we cannot make an exact comparison in the absence of Prussian ton-mileage. Generally, however, Prussian freight rates have been about one-third higher than our average, and at that rate the traffic per inhabitant would be 418 ton-miles in Prussia against 1,248 actually in this country—which seems an enormous amount of movement to be made for one poor body.

The number of regular employés (called "officers" there, but including enginemen, firemen, brakemen, etc.) was 94,027 on the Prussian system. These for the most part are permanently engaged, and are not discharged whatever the condition of traffic. The other employés (laborers) numbered 183,659, making the total force 277,686, which is at the rate of 18.05 men men per mile of road, against 4.79 per mile in this country. One of the most striking features in the Prussian statement is the increase in this force during the year, amounting to 22,194, or nearly 9 per cent. The Prussian state railroads, with less than one-tenth of our mileage, have about two-fifths as many employés.

The falling off in the profits of the state railroads has naturally attracted much attention in Germany, particularly as it has not yet ceased. A further reduction of $10,000,000 is expected for the year now about to close, and for the next year (ending March 31, 1893) the official estimates are for a further increase of $10,320,000 in expenses against an increase of only $8,778,000 in earnings, which would make a decrease in net earnings of $24,000,000, or 26 per cent., in three years. The Minister of Finance, when introducing his estimates in the Prussian Diet, declared that the failure of last year's national revenue to reach the estimates had been due to a "surprising and important increase" in the expenses of the state railroads, and declared that he should pay special attention to this department. A deputy intimated that, with profits decreasing at this rate, it would be necessary to sell or lease the state railroads. This brought Prime Minister Caprivi on his feet with the declaration that this was not to be thought of. Not only military necessities, but general political considerations, made the state railroad system indispensable.

The Minister of Public Works, Mr. Thielen, who is responsible for the management of the state railroads, but has only held office since last June, explained as follows the reduced net earnings: The working of the state railroads, he said, was a business involving risks, like every other business enterprise, and liable to fluctuations the same as private undertakings. Expenses have been unusually great in all kinds of business of late years, and in a great enterprise like the state railroads the effect is striking. When business falls off, earnings decrease much faster than expenses; indeed, the latter continue to increase for a time. In the estimates for the state railroads the larger part of the increase of expenses is for salaries and wages, which have risen considerably generally; the railroads had had to follow the general course of wages. The force of employés was increased, because traffic had increased, the hours of working had been reduced, and less Sunday work had been required. Train service had been increased, not only because traffic had grown, but because passenger trains on many main lines had been too heavy, requiring two locomotives, which lessened their safety. The rise in coal alone, due to the great miners' strike, had added about $1,000,000 to the expenses, compelling the importation of Belgian and English coal at very high prices, which, after all, was not as good as German coal. The previous year traffic had been so pressing that rolling stock had been kept in service till the latest possible moment, so that an extraordinary proportion of it required important repairs during the following year, during which, however, occasion was taken to increase by one-fourth the capacity of 30,000 freight cars.

The most important result of the reduction in profits of the Prussian state railroads is likely to be the indefinite postponement of the much talked of and much desired reduction of passenger rates, not in Prussia only, but throughout the German Empire, where the public has been led to demand such a reduction by the examples of Hungary and Austria, and where serious studies and plans had been made, and negotiations among the different countries had reached such a point that it seemed certain that a reform would be introduced during the current year, as in all probability would have been the case if Prussia did not feel the need of making a considerable revenue for general state purposes out of its state railroads.

Minister Thielen, in his address to the Diet, declared that the condition of the finances forbade experiments which might increase expenses or decrease earnings. He regretted to include in these the extensive reforms and reductions in passenger and freight rates which had been planned and elaborated. He did not regard the reduction of fares of such pressing importance as the popular discussion of the subject would indicate. Passenger traffic grows continually with the present rates. Moreover, there is no general agreement as yet as to what the new rates ought to be. His predecessor, Minister Maybach, has circulated a plan for reduced fares to all the district railroad councils, which represent the interests of the public, requesting their opinions and suggestions. No two of these councils agreed in their opinions on it. None approved it entirely, and they did not agree in any of their suggestions. One wanted round-trip tickets abolished, another would have them preserved; some would abolish the fourth class, while others considered it absolutely indispensable; one would have no free baggage allowance, but require a small payment on the smallest shipment; others advocated a middle course: one was in favor of an additional charge on fast trains, another not. Mr. Thielen intimated that he favored a simple tariff and one particularly favorable to local travel. The one point on which opinion was unanimous was that the reformed tariff should *not* be a zone tariff. What he most regretted, however (and at this distance he seems to be decidedly right in this), was the postponement of proposed reductions in freight rates. In reply to a statement that the concentration of the railroads in the hands of the state had prevented reductions of rates that would have been made had the old mixed system of state and private railroads continued, the Minister said that investigation showed that since Prussia began to absorb the private railroads the reductions in rates made amount to about $24,000,000 yearly on the present traffic.

In Bavaria a new passenger tariff, basing rates on 0.77, 1.347 and 2.31 cents per mile, had been proposed and presented for adoption in the Empire, and Bavaria was ready to adopt it, the authorities estimating that whatever decrease in profits there might be under it at first would be easily borne, and would be made up within six or seven years; but Prussia having postponed a reduction on its roads, Bavaria does not propose to make any, it somehow being regarded more important to have rates uniform throughout the Empire than to have them lower than at present in some of the countries. At a recent session of the Bavarian Chamber several deputies were opposed to this submission of the policy of their country to the necessities of a neighbor, but the responsible minister did not agree with them, and in discussing the subject seemed willing to make it appear that the subject is not of much importance anyway.

It is not at all impossible that the policy of decreasing net earnings may have been intended. It should be remembered that even after all the losses, the state railroads are expected to yield the Prussian Government next year a profit of $30,000,000 above what is required to pay interest on the outstanding railroad debt. It is the natural ambition of the manager of such a system to give the public the maximum amount and quality of service for their money. If he can depend upon an income much beyond what is required for the property under his charge, he naturally wishes to supply new accommodations for which he has felt a popular demand, or reduce the price of the old ones. The recently proposed and now postponed great reduction of passenger fares would have been very popular with the public, and the minister in charge of the state railroads, more than any one else, would have got the credit of it. It is now postponed, not because the state railroads cannot afford it—they could pay all their expenses and all their interest in spite of any probable reduction of profits due to such a change—but because the Prussian government wants the railroads to return a large profit in addition to the interest on their cost, just as if it were an ordinary ungodly stockholder. It wants to use the state railroads as a taxing machine; and perhaps it is right. It must get a great deal of money out of the people in some way, and it is not so easy to find new ways as to hold on to old ones to which people are accustomed and the results of which are pretty well known. In course of time, if it continues paying off its railroad debt at the present rate, Prussia will have *no* interest to pay on railroad capital, and can reduce rates till they equal working expenses, without loss—when, we may add, the road may be "economically" worked for 100 per cent. of the earnings. But it does not follow that it will do so; it will continue to need an income for other purposes, and unless foreign competition compels the greatest possible reduction in rates, it will probably seek an income from its railroad property as it always has from its extensive mining and forest properties.

Transmission of Power by Electricity.

The Buffalo convention of the National Electric Light Association was really devoted less to the subject of lighting than to the more important uses of the current, such as operating railroads and transmission over long distances from the place where it is generated, thus rendering power available which has heretofore been useless. As this branch of electrical science is of especial interest to our readers a notice of this meeting is in order here, and as the information gathered can be best set forth in the form of a running account we put it in that shape.

At several places in the United States the power of waterfalls has already been used to generate currents which operate machinery at distances of from one to

three miles. Our readers are somewhat familiar with the most remarkable instance of power transmission which has as yet been undertaken, that which was shown in connection with the Frankfort exhibition last year, when the power generated at Lauffen, 108 miles away, was put into use at Frankfort to do lighting and pumping. No exact account of the percentage of the power employed at Lauffen which was delivered at Frankfort when the maximum work was going on has yet been given; but when 80 H. P. was in use about 72 per cent. of the current was available or, taking the losses in the generators and motors at 10 per cent., something over 60 per cent. of the power of the water-wheel was delivered to the machinery at Frankfort.

A comparison of this first considerable electrical conveyance of energy with the matured method of carrying it in the concrete form of coals from the mines to the boilers of manufactories over the coal railroads, shows rather in favor of the electrical transmission, for the cost of the coal at the mines is said to be doubled by the time it reaches a place of consumption 100 miles away, showing a loss of fifty per cent., or a gain in favor of electrical transport of energy of about ten per cent. As the electrical engineers have only just begun, railroad managers may have to give attention to this remarkable experiment. It was a long time before they could believe that oil could be pumped through pipes cheaper than it could be hauled in cars. When it comes to the conversion of the electric energy into heat, however, the difference is vastly in favor of the railroad and a base burner stove.

The current employed upon the Lauffen-Frankfort line was of a potential of 16,000 volts, and carried upon naked copper wires, of course an alternating current. The Oerlikon works of Zurich, Switzerland, have made a proposal to transmit power from Niagara Falls to Buffalo, using units of 5,000 H. P., with a current of 25,000 volts potential, with a loss in transmission estimated at about 16 per cent. Mr. Dobrowolsky, of Berlin, is ready to contract to transmit 5,000 H. P. from Niagara to Chicago, using a voltage of from 40,000 to 50,000 upon the line. It is amusing to recall the horror of the continuous current advocates, a couple of years ago, at the fearful potential of 5,000 volts which some of the alternating systems proposed to employ.

Ferranti is using a current of 10,000 volts in London. There is an experimental line at Pittsfield, Mass., carrying 15,000 volts. It is now said that currents of 100,000 volts may be safely sent through wires encased with oil, and such a current is advocated as the lowest pressure which would be commercially profitable over distances of thirty miles or more. As the "striking distance" increases very rapidly with the the increase of potential, it is fortunate that the current may be raised or lowered to any desired tension by the use of transformers, so that we need not have the long-distance, striking kind of electricity for domestic use, but only a mild and orderly variety of the current.

Great progress has been made in the construction of transformers and also in the alternate current motors; yet if the alternating current motor is not quite satisfactory, the current may be converted from alternating to continuous at the place where you require it for use, and the direct current form of motor used instead of the alternating. Although it is unseen and no person knows what the electric energy is, it is now treated with about the same convenience in handling as a stream of water in pipes. Any desired portion of the stream may be taken off from the main and carried at any pressure less than the total head to any point.

There is as yet no reasonably satisfactory conduit for electric wires that are to be placed underground; that is to say, none that is convenient for inspection and testing, and which does not involve a too great expense, when the value of the service rendered is considered. The committee of the Electric Light Association, appointed to investigate the subject, made a report of a very discouraging character. It is quite evident that if one-half, or perhaps if one-quarter of the cost of underground conduits were to be expended upon the insulation and permanent erection of aerial lines, the result would be entire security for persons and property, and greater convenience for the electric companies. No cheap method will answer for underground work, and ought not to be tolerated above the surface.

It is stated that in New York City the Subway Company reports an expenditure of about $5,000 per mile of duct, of 3 inches diameter, including the necessary manholes. In addition the cables containing the wires must be first highly insulated and then covered with lead, costing from four to five times as much as overhead conductors. The cost of each house connection from the subways on upper Broadway and upper Sixth avenue amounts to a total of from $130 to $250, and the average cost of a connection to a city lamp post is $110. It is in favor of the underground system that interruptions of the current from external causes are unknown and those from internal causes are rare. It is, however, cumbersome, not flexible like the overhead wire, which admits of the readiest extension.

In Chicago and Buffalo there are underground systems as to which the designers make favorable reports, somewhat attacked, however, by other experts. In Milwaukee an electric railroad company has laid plain lead covered cables underground without other protection, and they are said to be working satisfactorily, which they of course would do at first.

On the whole, we think the information imparted by the members of the convention at Buffalo, some of which we have epitomized, exceeded in practical interest the output (if we may so call it) of any previous meeting of the national association.

The Saxon State Railroads form a neat little system of 1,618 miles, 153 miles of which are narrow-gauge lines. Saxony, it should be remembered, is a little country, not much larger than Connecticut, but with a population of more than three millions, and full of mines and manufactures. It has a mile of railroad to every 3.57 square miles of area, and only very few parts of the world have a denser system; but it has a population of nearly 2,000 per mile of railroads, which ought to afford the railroads a sufficient support. The Saxon State Railroads have just reported for 1890. Their traffic in that year was equivalent to 422 passengers and 692 tons of freight each way daily, which is a heavy traffic. The average in this country was 104 passengers and 667 tons of freight. The gross earnings of the Saxony lines were $12,925 per mile, 30½ per cent. of which was from passenger traffic. They averaged $1.48½ per train mile, while the working expenses were 92 cents, leaving net earnings 56¼ cents per train mile, amounting to $4,723 per mile of road (against $2,300 in this country). The capital was at the rate of $98,123 per mile, and the net earnings yielded 4.97 per cent. on it. We may set some of these figures opposite to those reported for the railroads of the United States during the year ending with June, 1890.

	Saxony.	U. S.
Per mile of railroad:		
Capital	$98,123	$48,463
Gross earnings	12,925	6,725
Working expenses	8,202	4,425
Net earnings	4,723	2,300
Per train mile:		
Earnings	1.48½	1.44
Expenses	0.92	0.96
Net	0.56¼	0.48
Traffic—Each way daily:		
Passengers	422	104
Tons freight	692	667
Population per mile of railroad	1,967	385
Earnings per inhabitant:		
Total	$6.11	$15.69
Passengers	1.92	4.17
Freight	4.19	11.43
Proportion of net earnings to capital	4.97 p.c.	5.15 p.c

In New England, where travel is heaviest in this country, it is equal to 308 each way daily, or one-fourth less than in Saxony; but in a single State like Massachusetts, Connecticut or New Jersey, it is doubtless heavier here.

A railroad man from the far west, who is familiar with air-braked freight trains, and with the advantages derived from the use of power instead of hand brakes in freight service, writes to the *Railroad Gazette* to complain of the way in which Eastern roads are wasting their money and jeopardizing the lives of passengers by not using their air-braked freight cars as much as they might. Our correspondent has been traveling over some of the Eastern trunk lines and reports that he sees freight trains with as many as 15 cars equipped with air brakes which seem to be in good order, but are not connected with the engine. Several instances are specified in detail. The point is well taken, and the criticism will doubtless apply to a good many trains every day from now until the time when half or two-thirds of the freight cars of the country shall have been equipped with power brakes. The immediate question is, however, whether in any given case the conductor can reasonably be excused for not stopping to place the air brake cars next to the engine. There are many cases, doubtless, in which there is a very plausible if not a reasonable argument in favor of starting a train out in the ordinary way, to be controlled by hand, in order to avoid very serious delays to passenger trains. The nature of the road, whether level or hilly, the state of the weather, the number of air-brake cars in proportion to the whole train, and other variable factors must be considered; and, it is unnecessary to argue, the judgment of the yardmaster or conductor must be very largely depended upon. The superintendent should constantly bear in mind, however, that the trainmen have the force of habit to lead them to regard hand-brake running as right and safe, and that in doubtful cases the force of habit generally prevails. He should also remember that this is one of those cases, which he often sees in other matters, where the tendency to break away from the rules and follow personal inclination will constantly grow unless constantly checked. Moreover, he must be wide-awake to see that they do not misuse the brake when they do have it connected, and then try to excuse themselves for neglecting to put it in use on the ground that the train can be handled better without it.

As long ago as 1857 a French company was formed to build a wagon road from the chief port of northern Syria, Beirut, eastward across the two mountain ranges Lebanon and Anti-Lebanon, to Damascus, the great trading town of that part of the country, a distance of 87 miles. The road was built and afterward changed into a horse railroad. Now it is proposed to change it into a steam railroad and to build an extension 75 miles long from Damascus south to Mzerib, a place a few miles west of the Lake of Tiberias. The prospectus inviting subscriptions to the $12,000,000 of bonds issued for carrying out the enterprise makes a statement of a prosperity not usually attached to Turkish undertakings. It says that the road and tramway company which it succeeds paid off all its bonds within 20 years, and besides divided from 12 to 19 per cent. on its shares, and for the last five years had an average of about $240,000 of gross earnings per year, of which $100,000 went to the shareholders.. Yet it carried but a small part of the traffic, suffering from the competition of the native mule and camel-drivers, who are estimated to have taken 75,000 tons over the route, while the tramway transported only 25,000 tons. Further, the tramway handled only through traffic, having no station between Beirut and Damascus. With steam and way stations the company expects to destroy the camel competition and have all the business to itself, for what the mules and camels carry in 3½ days at the rate of 33 to 35 cents per 100 lbs., the railroads will take in five or six hours for 22 cents per 100 lbs. So without any growth of traffic it counts on earning $500,000 from the existing freight traffic. Besides this the present through passenger travel, which also goes partly on animals, amounts to about $25,000 yearly, paying $2 to $6 for their passage. The 500-franc three per cent. 90-year bonds are offered at 295 francs. The whole capital amounts to about $3,200,000 or nearly $20,000 per mile of road, and the prospectus estimates the profits will yield 11¼ per cent. on the stock. Even in France, however, a prospectus is sometimes mistaken—that for the Panama Canal was, we believe, not entirely accurate.

At the close of 1890 the Belgian state railroads measured 2,019 miles, having increased 25 miles during the year. Of the whole length, 828 miles were double track. The cost of the system amounted to $252,760,000, or $125,190 per mile. Block signals were established on 678 miles and the German electric bell system on 406 miles. On the main lines 83 per cent. of the rails are steel, but only 73 per cent. of the whole track. During 1890 only Goliath rails, weighing 104 lbs. per yard, were laid; 15,000 tons of these were used, costing very nearly $30 per ton. Out of 7,344,000 ties in track, only 221,000 were of metal; and in 1890 only impregnated oak ties were laid, costing $1.17 each. All but 11 per cent. of all the ties in track are of this kind. Per 100 miles of road, there were 95 locomotives, 234 passenger cars, and 2,155 freight cars—a very heavy equipment. The consumption of coal was 890,000 kilometre tons (2,204 lbs.), costing on an average $2.13 per ton (against $1.32 in 1889). The train mileage was 52¼ per cent. passenger and 47¾ per cent. freight, averaging 13,900 miles per engine. The average train had 7.57 passenger cars or 25.1 freight, the latter of 22,000 lbs. capacity. The average distance run by passenger cars was 19,280 miles = 53 miles per day; by freight cars 4,240 miles = 11.6 miles per day. Belgium, it must be remembered, is a very small country, with many short lines to mines and manufactories with very short hauls. Nevertheless, as with an average speed of 10 miles an hour, the freight trains would be moving 17⅜ days in the year, they seem to lie still an unconscionable part of the time—say 26 days out of 27. The average freight-train load was 171 tons, which is large for Europe, and very nearly equal to our average. The gross earnings were $13,243 per mile, and about 3 per cent. more than in 1889, but the working expenses increased more than twice as much as the earnings, leaving the net earnings 4.383 per cent. on the capital, against 4.798 per cent. in 1889.

The *Pathfinder* Railroad Guide publishes a lot of correspondence going to show that certain railroads in New England have received further "favors" from the sharpers who try to get annual passes in exchange for passes of their own issue which are good for first class passage to any one who pays full fare or goes afoot. The perpetrator of the fraud in this case seems to be a mail contractor at Washington, who sends out passes "good" over certain coastwise and other steamship lines with which he has no connection whatever, except, perhaps, as a mail contractor. It does not appear that this "General Manager," who, with a different front name, also acts as general superintendent, has succeeded in securing any railroad passes, though the back of his pass enumerates a dozen routes in all parts of the country on which it is good, from Eastport to Palatka and from Punta Gorda to Port Townsend. Unfortunately for the prospective user of the pass these are, however, nothing but steamship *lines* (not steamships) and it is quite likely that the holder of the pass would find that the last steamer had just sailed and that he would have to wade or swim in order to get over the "line" on the pass. It is certainly no more than fair to say that this method of traveling is decidedly inferior to that afforded by a river rafting company, or even by a saw mill slide.

Placing locomotive fireboxes above the frame is one of the most important improvements in locomotive construction within the last decade. We believe that the credit of first using this method of construction is due to the late James Millholland, so well known as a designer of rolling stock on the Philadelphia & Reading road for many years. The first engines having the firebox above the frame were the "Vera Cruz," "Minnehaha" and "Hiawatha" on the Reading road, built some years ago. They also had what is, strictly speaking, the Millholland frame, another important improvement in

locomotive construction, which consists in dropping the top rail of the frame back of the rear driver, or of one of the drivers, and allowing the firebox to follow the inclination of the frame, thus giving additional depth of firebox under the tubes. These are important improvements in locomotive design, and the originator deserves no little credit for having devised such an arrangement. These facts are brought to mind by a recent article in *Scribner's*, by Vice-President Webb, of the New York Central & Hudson Biver road, in which this construction is described in such a way as to lead one to believe that it originated with the designer of the engines hauling the fast express trains on the New York Central.

The reorganization of the board having in charge the Chicago Main Drainage Canal has already resulted in the adoption of a practicable route and contracts for the excavation of the lower end of the canal, which will cover most, if not all, of the rock cutting, will probably be let about the first of May. The route adopted is not the one proposed by the old board, in the bed of the Des Plaines, but will be in dry cutting. It is also proposed to let at the same time a portion of the canal below the cut, and make provision for utilizing water not needed for navigation for manufacturing power. Whether this is done or not a great deal of work will be offered to contractors and builders of excavating machinery.

The Thomson-Houston Co. is building an electric locomotive designed to develop 500 H. P. It is proposed to haul with this locomotive passenger trains of moderate weight, such as elevated railroad or suburban trains, at 40 miles an hour, or perhaps faster. This engine is built for the purposes of experiment and demonstration. Drawings have been prepared for an engine of 750 H. P., but we understand that this one will not be built until actual experience has been had with the lighter motor. It is not yet known where this motor will be tried. The experiment is one of very great importance and one which we have frequently urged the electric companies to make.

NEW PUBLICATIONS.

Annual Report of the Secretary of Internal Affairs of Pennsylvania for 1890. Part III., Industrial Statistics. This report, the author of which takes occasion to discuss a great variety of topics, is of interest to railroad men chiefly by reason of an interesting chapter on Railroad Relief Associations, which contains detailed accounts of the relief departments of the Pennsylvania, the Baltimore & Ohio, the Philadelphia & Reading, the Cumberland Valley and the Lehigh Valley roads.

TECHNICAL.

Manufacturing and Business.

The Drexel Car Coupler Co., of Chicago, has been merged into the Drexel Railway Supply Co. This company handles, as before, the Drexel car coupler, also the Drexel journal box, which has been illustrated recently in our columns. Orders have been received for between 30,000 and 40,000 of these lids. The company has recently opened an eastern office in 29 Broadway, New York City, with M. A. Kilvert as Manager.

At the Philadelphia Bridge Works of Cofrode & Saylor reduction of 10 per cent. in wages has been announced. This affects 600 employés after March 14. A similar order was made recently at the Reading Rolling Mill, Reading, owned by the same company.

The Crossley Car Brake Co., of Cleveland, was incorporated, with $25,000 capital stock, last week by H. A. Crossley, A. S. Devries, J. P. Macbeth and S. Dean.

Iron & Steel.

The Penn Steel Casting and Machine Co. has been organized to build a new plant for the Penn Steel Works at Chester, Pa. The dimensions of the new steel foundry will be 225 × 100 ft.

The Buffalo Steam Forge Co., of Buffalo, N. Y., has gone into the hands of a receiver. The liabilities are $61,681, and the assets $24,633. The company was organized in 1890 for the manufacture of car axles and railroad forgings.

The Pennsylvania Steel Co., Steelton, Pa., has ordered for its bridge construction department a steam hydraulic Ridgway crane of 15 ft. lift and 36 ft. radius, which will be used for loading bridges and handling material. One of these cranes was recently built for a blast furnace at the plant, and they are to be used in several other departments.

The Southern Malleable Iron Co., of Chattanooga, Tenn., is erecting an addition to its plant 100 × 50 ft.

The Fort Payne (Ala.) Furnace Co. elected the following directors at a recent meeting: R. W. Gordon, C. S. Abbott, J. A. Wilder, G. E Lathrop, E. D. Freeman, W. A. Jencks, A. H. Layles. The total cost of the furnace to date is $130,000, and the company has a paid-up capital of $100,000, with bonds sold to the amount of $28,000.

The Pueblo Steel Works are announced to open on April 1, but it is possible that operations may not be commenced so early.

New Car and Machine Shops.

The Florida Central & Peninsular Railroad is building new car shops at Fernandina, Fla., and as soon as they are completed the machinery in the temporary shops at Tallahassee will be removed to Fernandina.

The Lima Machine Works has purchased the shops of the Lafayette Car Co., at Lima, O., which have not been in operation during the fall and winter. It is reported that the Lima Machine Works will use the shops for the manufacture of freight and passenger cars.

The Boston & Maine has applied to the city of Lynn, Mass., to close certain city streets for a new station in Lynn, for which plans have been prepared. It is said that the expenditure for the new station improvements will reach $300,000.

A Movable Sidewalk.

A pamphlet has been issued describing the Multiple Speed and Traction system of platforms which have been in operation at the World's Fair grounds at Chicago for the last six months. The pamphlet contains some good cuts illustrating the applications of the device to street railroads, together with numerous testimonials from those who have ridden upon the conveyance, as well as opinions of the technical and daily press. The installation of this system, which has been exhibited at the World's Fair Grounds, Chicago for the past six months, is now assuming a more complete form. Estimates have been furnished to the World's Fair officers, which are being favorably considered.

Compound Locomotive Tests.

The Western Maryland Railroad has just completed comparative tests of two consolidation locomotives, one a single expansion, the other a Baldwin compound. Both were built by the Baldwin Locomotive Works. The general dimensions are:

	Compound.	*Single Expansion.*
Cylinders	13 and 21 × 26 in.	20 × 24 in.
Driving wheel	51 in.	50 in.
Boiler, diameter	60 in.	60 in.
Steam pressure	175 lbs.	140 lbs.
Firebox	103 × 42 in.	103⅝ × 41⅛ in.
Fuel	Soft coal	Soft coal.
Tank capacity, gals.	3,000.	3,300.

Results: On a 97-ft. grade, where both engines were hauling a load that was "too much for either of these engines to haul regularly," the compound showed a saving of 44.9 per cent. of fuel. The compound "did not fail to keep the train moving on any part of the mountain."

Union Switch & Signal Co.

Mr. George Westinghouse, Jr., voted on 14,183 shares of stock at the annual meeting of the company March 8, against 6,596 shares for the re-election of the present directors. The new directors are: George Westinghouse, Jr., A. M. Byers, Thomas Rodd, E. H. Goodman, W. Scott Fitz, J. H. Willock and William Conway. The election of officers was deferred.

Tampico's Deep Water Harbor.

A steamship from Newcastle, with 1,200 tons of coke for smelters at Monterey, Mex., crossed the bar at Tampico, March 8, drawing 17 ft. She is the first vessel to enter with full cargo since deep water has been obtained.

THE SCRAP HEAP.

Notes.

A San Francisco dispatch states that the time of through passenger trains between San Francisco and New Orleans is to be shortened 12 hours.

The Boston & Maine is building a grain elevator at East Boston, adjoining the docks of the Cunard Steam ship line. It will have a capacity of one million bushels.

On the Pittsburgh Division of the Baltimore & Ohio one day last week the fireman of a freight train was shot and killed by a brakeman while the train was on the road. It is said that the brakeman was a new man who had been angered by the teasing of his fellow-employés.

The Texas & Pacific is reducing its forces as much as possible, the endeavor being to cut down expenses 10 per cent. A number of men have been discharged from the shops of the Erie road at Port Jervis, at Buffalo and elsewhere. Railroad freight traffic has been somewhat interrupted at New Orleans by a strike of 'longshoremen.

There is on trial at Elmira, N. Y., the case of Van Duzer vs. Elmira, Cortland & Northern Railroad, for alleged damage by flooding of lands in the freshet of June 1, 1889. The flooding is claimed to have been caused by insufficient water way in the defendant's bridge over Newtown Creek, in Horseheads, near Elmira.

The Lower House of the Virginia Legislature has passed the Mason railroad bill, which provides for but one railroad commissioner. It has a long-and-short haul clause, but does not give authority for fixing rates. The Upper House of the Mississippi Legislature has passed a bill imposing a privilege tax on railroads.

Suits have been entered in the United States Court at Charleston, S. C., on which injunctions have been issued restraining the state officials from attaching the property of railroads for non-payment of taxes, there having been a dispute as to the correct basis of assessment. It is said that all the roads in the state participated in the application.

A bill has been introduced in the New York Legislature which requires railroad companies to get the names of all the witnessess of train accidents and file them with the County Clerk forthwith, under penalty of $250 for each omission. Witnesses who refuse to give their names forfeit $50. A witness must not be examined or asked to make a statement outside of court except on proper notice to persons injured by the accident.

The committee of conductors and trainmen which has been in conference with the officers of the Atchison, Topeka & Santa Fe, at Topeka, for several weeks, reports that it has secured an advance of pay, together with other changes which will be to the employés' benefit. The conductors are, however, still complaining because the company has notified them to give bonds from a different guarantee company than that which they have heretofore dealt with. The new company examines the men's records very closely.

The Mexican International Steamship Company, which has recently been organized in Philadelphia by ex-Consul-General Porch, has arranged to charter two steamers for immediate service between Philadelphia and Mexico. The company expects to put under contract during the year several new steamers for this trade. Henry C. Ayer, of Pedrick & Ayer, is President of the new company. The other directors are Burnet Landreth, William T. Yeager, Robert H. Foederer, Thomas A. Gummey, Thomas Martindale, B. F. Taylor and Henry C. Ayer.

Mayor Washburn, of Chicago, has decided to appoint a commission of three experts to study the problem of elevating the terminals of that city and has already selected two of the members, E. S. Dreyer, President of the Real Estate Board, and George Hackney. The Pennsylvania Company desires to enlarge its yard in the south part of the city and has made a proposal to the city under which the road will build a bridge over the tracks at that point (Fifty-first street), but the Mayor says that he will not approve any plans for new overhead bridges until his commission has made its report.

Spanish-American Notes.

The government of the state of Santa Fé, Argentine, is proposing to offer its state railroads for sale.

The Midland Uruguay Railroad, which has been operating at a loss, is now in receipt of earnings sufficient to cover working expenses.

The Buenos Ayres Great Southern Railway from Buenos Ayres to Bahia Blanca has at its own expense dredged out the entrance to the Rio Naposta, at Bahia Blanca. It is noticeable that this line has been gaining in prosperity since it threw up its guarantee.

The recent discoveries of coal in Argentine have proved to be of such importance, and the product of the mines is of so excellent a quality, that a number of the railroad companies of that country have declined to renew their contracts with the British mines, purposing to depend upon the home supply.

The municipality of Taubaté, state of Sao Paulo, Brazil, has asked for tenders for a new market building, with cold air rooms, and other appurtenances, to be built of iron. Taubaté is situated in the northeastern part of Sao Paulo, on the line of the Sao Paulo & Rio de Janeiro Railroad, in a very healthful region.

The Sorocabana Railroad Company, whose line extends 118 miles southwest from Sao Paulo to Tieté, has been notified by the government of the state of Sao Paulo to make alterations in its passenger cars, additions to its rolling stock, and to fence its lines with wire fence, within the next nine months, subject to a penalty of 1,000 millreis a day, which amount at present rate of exchange equals about $240.

The city of Sao Paulo, one of the most beautiful, progressive and healthy cities in Brazil, is contemplating the introduction of a system of electric lighting. The Companhia Agua e Luz do Estado de Sao Paulo has made a proposition to light the city at one-half the cost of gas. The contract for the plant will probably be offered in this country.

Of the total 801,000 barrels of flour consumed in Brazil in 1891 no less than 58 per cent. was produced by the mills of that country. The wheat for the Brazilian mills has formerly been imported from the United States, Russia and New Zealand. Arrangements have now been made to secure grain from the La Plata countries, and also from the Brazilian states of Rio Grande do Sul and Paraná, where wheat culture is being resumed after having been almost abandoned on account of the smut. This will largely benefit the railroads of those states.

The block in the port of Santos, Brazil, had become so serious that a committee of Sao Paulo importers recently sent a memorial to the President of the Republic, praying that temporary piers be constructed, and that the immigration depot and other buildings be employed for the storage of merchandise, and also that the system at the custom house be simplified to expedite the discharge of vessels. They also insist upon better train service on the Sao Paulo Railroad, increase of motive power on the inclined plane, and additions to the rolling stock on the Central Railway.

The Argentine government has announced its determination to collect 50 per cent. of the gross earnings of the guaranteed lines of railroad. This requirement had not been complied with by these lines on account of the failure of the government to fulfill its obligations toward them. The moratorium bonds which the railroads have been forced to accept in lieu of interest the government agrees to receive in liquidation of its claim upon the gross earnings. This would in many cases amount to the roads receiving no interest at all. Some of the railroads are talking of abandoning the guarantees altogether.

There is no apparent recovery in the receipts of the Argentine railroads, nearly all the roads in the Republic being operated at a loss. The following table of a few representative roads will give some conception of the existing state of affairs:

Name of road.	Total receipts.	Decrease over 1890.	Perc't'ge of oper. exp.	Bal. after payment of int., etc.
Great Southern	$2,651,130	$768,984	59.00	+ $517,290
Western	1,279,152	407,638	55.00	+ 24,345
Rosario	2,486,862	440,000	59.00	— 98,228
Central Argentine	3,408,435	1,826,600	69.37	— 161,065
Ensenada	852,930	290,433	57.00	— 36,540

The figures for the first two of these roads represent accounts for the first half of 1891 only; but it will be observed that in all cases the burden of interest must have been very high. This accrues upon the preferred stock, which was issued to raise money for extensions of the lines, and unfortunately the payments have frequently been made out of the capital and charged to the construction account. This haste to increase the length of road beyond the needs of traffic is part of the evil resulting from the policy of guaranteeing interest upon

the railroad capital, and now that the government gives moratorium bonds, salable only at immense discounts, in place of interest, the companies find themselves struggling under vast loads of debt. The bulk of traffic has increased on some roads in 1891, but the depreciation of the currency has reduced the actual income, while the proportion of cost of operating and maintenance has assumed an alarming size. This growth of the expense account is well shown by the Central Argentine Railroad, where the percentage in 1889 was 54.17 per cent.; in 1890, 60.3 per cent., and in 1891, 69.37 per cent.

Ventilation of Railroad Cars.

The general public is becoming aroused to the necessity of improvement in this respect. Dr. J. M. Keating in the December *Climatologist*, has a paragraph expressing the views of a multitude of travelers: "There is no doubt whatever that we all appreciate fully the comforts of modern travel, and are grateful for them. Nevertheless for the invalid there is much that is trying and most fatiguing. The subjects of proper ventilation and heating of cars, and especially of sleeping cars, does not seem to have received the attention it deserves, and certainly from a standpoint of hygiene the Pullman car and other sleepers are as far behind the times as the prairie schooner is to the vestibule train. It is to be hoped that the Association of Railway Surgeons or some other influential individual will take this matter in hand and give us an anti-microbic sleeper temperately heated and well ventilated. Get rid of the heavy hangings and stuffing which certainly are germ carriers. For the sea voyagers much has been done. The present new ships are models of hygienic perfection."—*Annals of Hygiene.*

Coal to Canada.

The Canadian tax of 60 cents per ton on bituminous coal, which was imposed with the intention of shutting out competition from Pennsylvania against the Nova Scotia coal miners, has apparently failed of its purpose. In spite of the duty the imports increased from 1,498,950 tons in 1890 to 1,697,485 in 1891. Of this importation, 1,562,500 tons went into Ontario, so that nearly the whole burden of this increased tax was borne by one province.

A Result of the St. Clair Tunnel.

It is said that the Grand Trunk Railway Company will immediately take down the cattle sheds, ice-houses, freight sheds, and other structures on its Point Edward property, and will take up the tracks in the yard, in furtherance of the scheme for turning the Point Edward station property into a summer resort.

Insurance Against Loss of Baggage.

The American Baggage Indemnity Co., the office of which is at 187 La Salle street, Chicago, is a concern lately organized to insure against loss or theft of baggage, damage, pilfering, etc., by means of daily tickets, after the manner of the accident insurance companies. Each ticket constitutes a policy for $100 and has coupons showing the number of days for which it is good, which may be from one to ten. The rate which it is proposed to charge is 10 cents a day. The contract is not limited to personal baggage, and any number of $100 tickets, up to 10, will be issued on a single piece of baggage. The company intends to insure only baggage that is checked, thus confining its risks to those for which it will expect to reimburse itself by a demand upon the carrier. The agreement binds the company to hunt up lost baggage as soon as possible, on notice, or to pay the amount of the policy within 60 days. It will be seen that the principal advantage to the purchaser is certainty of settlement and insurance of those kinds of baggage for which carriers are not liable.

The company proposes to make contracts with railroad companies guarding against fraudulent presentation of claims to both the insurer and the carrier. It also proposes to insure railroads against all their losses for lost and damaged baggage. The President of the company is Mr. Fred. E. Sander, of Seattle, Wash., and the Treasurer is Mr. L. D. Bruns. The Secretary is Mr. A. D. Hart, whose office is at Chicago as above.

A Pass Fraud.

Several requests for passes on a fraudulent letter head of the Richmond & Danville have been presented to railroad officers at Chicago, and General Manager Green, whose name is forged on the applications, has issued a circular containing the following caution:

"Our connections are hereby advised that applications from this office will hereafter be made on printed forms only, and are not to be recognized unless bearing my office stamp and countersigned by myself or person designated on the form; and, when a special explanatory letter is written covering an application from this office for a pass, one of our printed forms of application will be attached to such letter, and our connections are requested not to issue passes on our account unless such printed form of application be received. Telegraphic requests for passes will be made only in extreme emergencies, and such telegraphic requests will be invariably confirmed by mail."

LOCOMOTIVE BUILDING.

The Cooke Locomotive and Machine Co. has delivered the last of the 10-wheel engines to the International & Great Northern, and is now at work on engines for the Bangor & Portland, New Jersey & New York, Houston & Texas Central, Louisville & Nashville, and two for export.

The Baldwin Locomotive Works are building, as we have before noted, a compound Abt rack locomotive for the Manitou & Pikes Peak railroad. The following general dimensions will serve to indicate its power. The cylinders are Vauclain type, 9 and 15 in. × 22 in. The carrying wheels are 25½ in. diameter. The gear wheels are about 22 in. diameter, on pitch line. The wheel base is 10 ft. 9⅝ in., and the estimated weight is 23 tons, with a tank capacity of 400 galls. This engine has been guaranteed to push 25,000 lbs. of cars and loading from the base of the mountain to the summit in two hours. The maximum grades are 25 per cent. The engine is to be ready for delivery in May.

CAR BUILDING.

The Philadelphia & Reading has ordered 150 box cars from the Lebanon Mfg. Co.

The Columbus, Hocking Valley & Toledo will soon have in service six very handsome sleeping cars, now nearly completed.

The Madison Car Works at Madison, Ill., has about completed an order for fruit cars for the Plant system, and they are now working on an order for 1,000 cars for the Chicago, Burlington & Quincy.

The Pullman Car Co. has completed for the Chesapeake & Ohio four remarkably handsome sleeping cars to run on the limited trains, part of an order of 12 cars. Each car has 12 sections, a drawing room and a double smoking compartment that will accommodate 15 people. The car is finished with the new vermilion wood and mahogany, and the upholstering is in brown plush.

The Chesapeake & Ohio has decided to let at present only 400 of the 2,000 cars which have been talked of. The Ensign Mfg. Co., of Huntington, W. Va., has been awarded an order for 200 and the Tredegar Iron Works, of Richmond, Va., for the other 200 cars. All the cars will be equipped with automatic couplers and air brakes, and 25 of the number will have the Fox pressed steel truck.

The Chicago & Eastern Illinois some time ago placed an order with the Pullman Car Co. for 20 day passenger cars which have just been received. Ten of these will be put in the suburban service and ten on the through trains between Chicago and Evansville. Those for suburban trains seat 64 passengers and are finished in quarter oak, and those for through service are finished in mahogany.

BRIDGE BUILDING.

Allentown, Pa.—The County Commissioners, the Lehigh Valley Railroad and the Allentown & Bethlehem Rapid Transit Co. have decided jointly to build a large bridge over the Lehigh River at Lower Catasauqua. It will cost $25,000.

Alton, Ill.—The contract has been let for the masonry and foundations for the new bridge over the Mississippi River at Alton and the contractor has already commenced work. The bridge was designed by Mr. George S. Morison, of Chicago, and the plans have been approved by the Secretary of War. They consist of a draw 450 ft. long, one span of 380 ft. and 6 spans of 210 ft.

Anacortes, Wash.—The new steel drawbridge across the Swinomish slough, Puget Sound, was recently inspected and accepted by the Oregon Improvement Co.'s Superintendent.

A new bridge connecting Fidalgo Island with the mainland will also be built.

Atkinson, Neb.—A new bridge will probably be built across the Niobrara River, between Atkinson and Butte.

Bay City, Mich.—The Bridge Commission received 15 tenders for building three spans for the Twenty-third street bridge. The bids range from $19,000 to $35,000, but the contract was not awarded.

Chicago, Ill.—The construction of the bridges over the Chicago River at Eighteenth street and Fourteenth street, upon which it was proposed to expend $300,000, has been postponed indefinitely, on account of the decision of the court, which has ruled that the consent of the Secretary of War must be obtained before the bridges can be built or condemnation proceedings begun, the river being a navigable stream.

Crookston, Minn.—Work on the piers for the Great Northern bridge, across the Red Lake River, is being pushed. The superstructure will be of iron and the contract will be awarded at an early date.

Duluth, Minn.—The contract for building the iron superstructure of the Lake Avenue viaduct, across the right of way of the St. Paul & Duluth Railroad has been let to the Shiffler Bridge Co., of Pittsburgh, Pa., for $45,600. The bids of the Boston Bridge Works, $42,544, and the Detroit Iron and Bridge Works, were rejected because they did not comply with the specifications of the Board of Public Works.

Eagle Lake, Tex.—The County Commissioners have decided to build a bridge across the Colorado River at Eagle Lake.

Elizabethport, N. J.—The New Jersey Senate has passed a bill providing for the erection of a bridge across Newark Bay, from Elizabethport to Bergen Point, by Union and Hudson counties.

Elrod, Pa.—The survey has been completed for the $50,000 bridge over the Youghiogheny River from Elrod to Boston, to be built by the Boston Bridge Co. The stock has all been disposed of, and work will begun in April, the bridge to be completed during the year.

Fort Wayne, Ind.—The County Commissioners are considering the question of erecting a new bridge at the State line.

Great Falls, Mont.—Mr. George E. Ingersoll, of Great Falls, has been awarded the contract for building two combination iron and wooden bridges across Deep Creek for $9,550. The bridges will have 120-ft. spans and 16-ft. roadways.

Hawkinsville, Ga.—Proposals are wanted by the Pulaski County Commissioners, until March 22, for removing the fixed iron highway bridge, over the Ocmulgee River, and constructing in its place an iron or steel drawbridge.

Leavenworth, Kan.—The Leavenworth Terminal Railway & Bridge Co. and the Leavenworth & Platte County Bridge Co. have been organized.

Lisbon Falls, Me.—The bridge at this place is reported unsafe, and the town has been requested to build a new iron structure. The bridge over the Androscoggin, at Durham, is also reported unsafe.

Middletown, Conn.—The Selectmen have contracted with the Berlin Iron Bridge Co. for a new iron bridge.

Mount Vernon, O.—The Knox County Commissioners have been empowered by a bill, which recently passed the Ohio Legislature, to raise money to build the Main street viaduct.

Mt. Vernon, Wash.—The commissioners of Skagit County, Wash., have advertised for bids for the construction of a bridge across the Skagit River, 600 ft. long, with a draw-span of 200 ft. Estimated cost, $25,000 to $30,000. Bids will be received up to April 1.

Muskingum County, O.—A member has introduced in the Ohio Legislature a bill to authorize the commissioners of Muskingum County to issue $30,000 in bonds to complete a bridge over the Muskingum River.

New Brunswick, N. J.—The Board of Freeholders of Middlesex County, N. J., have voted to build a new stone arch bridge across the Raritan River at Albany street according to plans of Dean & Westbrook, of New York. The structure is to cost about $100,000.

Newport, Pa.—The Pittsburgh & Lake Erie has completed a new bridge at Newport over the Beaver River, which has three spans each 103 ft. in length, the girders each weighing 25 tons.

New York City.—The New York Legislature has passed a bill providing for a drawbridge across the Harlem River Canal at 222d street, Kingsbridge. It is to be not less than 26 ft. above high water and not less than 240 ft. long between the abutments. The bridge will cost about $400,000. It is to be built under the direction of the Commissioner of Public Works.

Orange Grove, Tex.—A bill has passed the Indiana Legislature to establish a free bridge over the Patapsco River near Orange Grove, to be built by Howard and Baltimore counties.

Riverton, Va.—A bill has passed the Virginia Legislature authorizing Warren County to borrow $12,000 for the construction of a bridge over one or both branches of the Shenandoah River at Riverton.

St. Cloud, Minn.—The Great Northern will build an iron bridge across the Mississippi River, and it is understood that the contract for the superstructure will be let soon. The piers are already built.

South St. Paul, Minn.—The Belt Line & Bridge Co. has been granted an extension of time for building the proposed bridge across the Mississippi River, until Feb. 1, 1893. Right of way for the belt line from Mendota to South St. Paul is being secured, and the company is now ready to receive propositions from builders for constructing the railroad and wagon bridge. This bridge will bring the Chicago, Burlington & Northern and the Chicago, Milwaukee & St. Paul into the stock yards with the shortest possible transfer, and the line to Mendota will admit the Chicago, St. Paul, Minneapolis & Omaha without transfer or delays in the yards in St. Paul. The officers of the company are; Charles L. Haas, President; Frank Clifton, Vice-President; William R. Todd, Secretary, and H. B. Carroll, Treasurer.

Velasco, Tex.—The Brazos River Channel & Dock Co. has applied to Congress for permission to build a bridge across the Brazos River.

West Superior, Wis.—Work has commenced on the Duluth & Winnipeg bridge across the St. Louis at New Duluth.

Wheeling, W. Va.—The stone arch bridge over Wheeling Creek at Main street was swung clear of the supporting false work March 9. It sank just two inches at the keystone. The span is 159 ft. long, 48 ft. wide, and 35 ft. above the creek at the keystone. It is the second largest stone span in America and the fourth in the world. It contains more masonry than any other single arch in the world, and it is regarded as a great engineering success.

Youngstown, O.—The bill authorizing the Commissioners of Mahoning County to spend $25,000 more to complete a bridge on East Federal street in Youngstown has passed the Ohio Legislature.

Miscellaneous Notes.—The Groton Bridge & Manufacturing Co., of Groton, N. Y., has lately received contracts for a large bridge at Huron, Wayne Co., Mich., three spans at Danville, Pa., and several small spans in New York, New Jersey and Ohio. The company has lately completed the bridge across the Potomac at Hancock, Md., and will soon commence the erection of a three span bridge at Caribou, Me.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Boston & Albany, quarterly, $2.00 per share, payable March 31.

Chicago & Northwestern, quarterly, 1¾ per cent. on the preferred stock, payable March 24.

Connecticut River, semi-annual, 2 per cent., payable April 1.

Iowa Central, 1 per cent. on the preferred stock, payable April 11.

Keokuk & Western, 1 per cent. on the preferred stock, payable April 1.

Lehigh Valley, quarterly, 1¼ per cent. payable April 16.

Manhattan Elevated, quarterly, 1½ per cent. payable April 1.

New York & Harlem, (City Line), annual, 2½ per cent. on the preferred and common stock, payable April 1.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Chicago & Alton, annual, Chicago, Ill., April 4.

Herkimer, Newport & Poland, special New York, N. Y., April 4.

Herkimer, Newport & Poland Extension, special, New York, N. Y., April 4.

Joliet & Chicago, annual, Chicago, Ill., April 4.

Long Island, annual, Jamaica, N. Y., April 12.

New York & Rockaway Beach, annual, New York, N. Y., March 22.

Oregon Short Line & Utah Northern, annual, Salt Lake City, Utah, March 16.

Pennsylvania, annual, Philadelphia, Pa., March 22.

St. Lawrence & Adirondack, special, New York, N. Y., April 4.

Texas & Pacific, annual, New York, N. Y., March 16.

Traverse City, annual, Travers City, Mich., May 5.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *New England Railroad Club* holds regular meetings, at the United State Hotel, Beach street, Boston, Mass., on the second Monday of each alternate month, commencing January.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* holds regular meetings on the third Thursday in each month, at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, N. Y.

The *Southern Railway Club* holds regular meetings on the third Thursday of the months of January, February, March, May, September and November at such points as are selected at each meeting.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets

on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday of each month. The annual meeting is held on the third Saturday in January. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* holds its monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Association of Civil Engineers of Dallas* meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The *Technical Society of the Pacific Coast* holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o'clock p. m. on the first Friday of each month.

The Tacoma Society of Civil Engineers and Architects holds regular meetings on the third Friday of each month, in its rooms, 201 and 202 Washington Building, Tacoma, Wash.

The *Engineers and Architects' Club of Louisville* holds regular meetings on the second Thursday of each month, at 8 o'clock p. m., at its rooms in the Norton Building, Louisville, Ky.

American Institute of Electrical Engineers.

The thirty-fifth meeting will be held at the headquarters of the institute, No. 12 West Thirty-first street, New York City, Tuesday evening, March 15, at 8 o'clock. A paper will be read by Mr. Alexander Wurts, of Pittsburgh, on "Lightning Arresters." Advance copies of this paper may be obtained by addressing the secretary, Mr. Ralph W. Pope.

Boston Society of Civil Engineers.

The annual dinner of the society was held at the American House, Boston, on the evening of March 8. There were about 125 members and guests present. There were eight or ten speeches, not too long and all of pretty good quality. Prof. Thomson's speech was really brilliant, and on the whole the evening was uncommonly pleasant.

Engineers' Club of Philadelphia.

The annual meeting was held Feb. 20, Past President Henry G. Morris presiding and about 40 members present. After some discussion a committee of five was appointed to confer with other engineering societies in Philadelphia on the advisability of erecting a building for their joint use. A memorial of Richard H. Lee, late active member of the club and Superintendent of the Logan Iron & Steel Co., which had been prepared by Mr. J. C. Trautwine, Jr., was read and ordered printed. The following candidates were elected members: D. P. Bruner, Walter C. Kerr, Paul A. N. Winand, Joseph C. Wagner, Henry L. Butler, Thomas Earle, Herbert P. White, Thomas Willis Fleming.

A paper was read by A. Saunders Morris on "Limitations of Electric Power Transmission, and discussed by Mr. Carl Hering and Mr. Morris. A continuation of the translation by Mr. Trautwine and others of M. Bazin's papers on weir experiments was read in abstract. In reply to inquiries as to the effect of different materials used in the weir, and as to the effect of air pressure upon the form of the "nappe," Mr. Trautwine wrote that, so far as he knew, M. Bazin had not yet extended his experiments to the question of the effect of different materials used in the construction of a weir, his object having been rather to remove, as far as possibe, all causes of friction, in order that his experiments might be carried on under conditions as near to theoretial perfection as might be. As to the second point, unless special precautions are taken, the falling sheet of water carries down with it part of the limited supply of air between it and the face of the weir, thus producing a partial vacuum there, as is evidenced, first, by the gradual approach of the sheet toward the weir, and, second, by the accumulation of a body of water between the two to a level above that of the down-stream surface. If the falling sheet of water, or "nappe," be then broken, whether intentionally or by the excess of air-pressure on its face, and the air is thus admitted behind the nappe, the latter immediately springs out to its normal position, but the process is repeated if the supply of air behind the nappe is again cut off. To avoid this complication, Mr. Bazin took special care, in his experiments, to provide free access of air between the nappe and the weir.

Technical Society of the Pacific Coast.

The regular monthly meeting of the society was held at its rooms in the Academy of Sciences Building, No. 819 Market street, San Francisco, on March 4. An address was made by Dr. R. Heidrich on Mnemonics and its usefulness to the technical profession memorizing data and formula.

PERSONAL.

—Mr. Ross Kells, Superintendent of Motive Power of the New York, Lake Erie & Western Railway, died early in the morning of March 10.

—Mr. Thomas Nixon Vandyke, who was the first President of the East Tennessee, Virginia & Georgia Railroad, died at Rome, Ga., last week.

—Mr. S. H. Chauvenet has been elected Vice-President of the Wellman Iron & Steel Co., of Thurlow, Pa., in place of William G. Neilson, resigned.

—Mr. Julian A. Hall, formerly Principal Assistant Engineer of the Richmond & Danville, is now Engineer for Grant Wilkins, of Atlanta, Bridge Builder and Engineer, having charge of all outside work.

—Messrs. W. G. Chase, Treasurer of the Mason Regulator Company, and Charles H. Barnes, of the Boston & Albany, sailed for Europe March 8 for an absence of six weeks.

—The Lukens Iron & Steel Co., of Coatesville, Pa., has completed its open-hearth steel plant, and has commenced operations. The plant consists of two 15-ton furnaces.

—Mr. Thomas J. Hyman, who was last week appointed assistant to President Hill of the Great Northern, was the Auditor of the Wisconsin Central until the removal of the office to Chicago a few weeks ago. The office to which he has been appointed has been vacant since the resignation of Mr. John N. Abbott, last July.

—The reports of changes in connection with the Superintendency of the New York Division of the Pennsylvania Railroad are entirely groundless. Mr. E. F. Brooks, as Acting Superintendent, will continue in charge until the recovery of Mr. Joseph Crawford, who is in the South, and from whom very favorable reports have been received.

—Col. Carswell McClellan, who died at St. Paul, March 6, served with honor and distinction on the engineer corps during the Civil War. He was engineer in charge of the construction works upon the St. Louis, Vandalia & Terre Haute, the Northern Pacific, St. Paul & Pacific and other Western railroads, from 1867 till 1881, when he became United States Civil Assistant Engineer, which post he held until his death.

—Col. James Montgomery, of Evansville, Ind., has been appointed General Superintendent of the Louisville, Evansville & St. Louis Air Line, to succeed Mr. George Evans, General Manager, who recently resigned to take a position with an Eastern line. Colonel Montgomery had been for several years General Superintendent of the Ohio Valley Road until its lease to the Newport News & Mississippi Valley, last year.

—Mr. Charles Parsons, President of the Rome, Watertown & Ogdensburg road, was elected President of the New York & New England at the annual meeting in Boston this week, and Mr. Charles Parsons, Jr., was elected Vice-President. Mr. Austin Corbin, who was elected President of the New York & New England early in January, declined re-election as President or as a member of the Board of Directors.

—Mr. H. W. Bates, F. R. S., Secretary of the Royal Geographical Society, died in London a few days ago. He is famous as an explorer and naturalist, having devoted many years of his life to this work in South America. He first visited the Amazon with A. R. Wallace in 1848, and remained in that region for 11 years, when he published his well known book, "The Naturalist on the Amazon." He was born at Leicester Feb. 8, 1825.

—Mr. Henry Nottingham, who died at Cleveland, O., March 7, was Superintendent of the Cleveland, Painesville & Ashtabula road between 1856 and 1868, until the consolidation of the Lake Shore & Michigan Southern. His jurisdiction was first between Painesville and Erie and was gradually extended as other roads were acquired, until at one time he was Superintendent of the entire line between Buffalo and Toledo, known as the Lake Shore.

—Mr. O. M. Dunn, who was recently appointed Superintendent of the Southern lines of the Illinois Central, received a very handsome diamond stud from the trainmen on the Louisville & Nashville before leaving for New Orleans. Mr. Dunn had been Superintendent of the Memphis line of the Louisville & Nashville since 1886, and was a Division Superintendent on that road for the three previous years. As Superintendent of the Southern lines of the Illinois Central he succeeds Mr. John G. Mann, who has been appointed Assistant Chief Engineer of the road.

—Colonel E. R. Dorsey, General Freight and Passenger Agent of the Georgia road, this week resigned that office, which he has held for 14 years. Mr. Charles E. Harman, General Passenger Agent of the Western & Atlantic, is mentioned as his probable successor, and is also spoken of in connection with the office of Assistant Commissioner of the Southern Railway & Steamship Association, but it is said to be uncertain whether he will resign his present office. Colonel Dorsey was Assistant General Ticket Agent of the Baltimore & Ohio between 1874 and 1878, and General Freight and Passenger Agent of the Charlotte, Columbia & Augusta between 1866 and 1873.

—Mr. F. W. Baldwin has been appointed General Superintendent of the Central Vermont system, succeeding Mr. James M. Foss, who has been appointed Assistant to the President. Mr. Foss is one of the oldest railroad men in active service in New England, having been born in 1829. He began his railroad service in 1846 as an apprentice in the machine shops of the Concord road. He became Master Mechanic of the Boston & New York Air Line in 1861, but returned to the Concord road in 1865 as Master Mechanic. In 1868 he was appointed to a similar position on the Vermont Central and has continued in the service of that company to the present, as Superintendent of Motive Power, Assistant General Superintendent and General Superintendent for the last seven years.

ELECTIONS AND APPOINTMENTS.

Akron & Eastern.—At a meeting at the office of the Pittsburg, Akron & Western, in Akron, O., March 2, the following officers were elected: President, W. A. Lynch; Vice-President, D. E. Hill; Chief Engineer, J. H. Sample; Secretary, C. W. Risley; Treasurer, F. M. Semple, all of Akron, O.

Austin, Fredericksburg & Llano.—The company was incorporated in Texas last week by Frederick Fries, Charles Perner, F. Marek, H. Muenzerberger, Adam Maurer, H. A. Marr and G. Beckers, all of San Antonio, Tex.; Charles P. Scrivner and George P. Warner, of Austin, Tex., and J. W. Hoyt, of New York.

Breckenbridge Company.—E. H. Irwin has been elected Secretary, with office at Louisville, vice A. A. Bullitt.

Carson & Colorado.—The stockholders of the new company are: D. O. Mills, F. G. Newlands., George Whittell, Thomas Bell, J. B. Randol, Horace L. Hill, H. M. Yerington, and William S. Wood.

Central Vermont.—F. W. Baldwin has been appointed General Superintendent, with headquarters at St. Albans, Vt. The office of Assistant General Superintendent, previously held by him, has been abolished.

Chattanooga Southern.—The Receiver, J. W. Burke, has appointed H. P. Eager Auditor, to succeed B. J. Robertson, resigned. Mr. Eager was formerly Superintendent of the Chattanooga & Lookout Mountain Road. F. S. Wallace has been appointed Superintendent and Chief Engineer.

Chicago, Altamont & Paducah.—The incorporators and directors are H. Smith, Clinton, O.; Walter G. Cowen, Charterri, Pa.; J. B. Messick, Thomas L. Tehete and E. Rhoads, of East St. Louis, Ill.

Chicago, Burlington & Kansas City.—H. C. Orr is now Assistant General Passenger and Ticket Agent of this line and of the Hannibal & St. Joseph, the St. Louis, Keokuk & Northwestern and the Kansas City, St. Joseph & Council Bluffs. This appointment was erroneously reported Feb. 12.

Chicago, Lake Geneva & Northwestern.—The first Board of Directors has been elected as follows: De-Clermont Dunlap, of Rockford, and Fremont Hill, Horace Alexander, John S. Monk and Francke C. Elliott, all of Chicago.

Chicago Milwaukee & St. Paul.—Richard Murphy has succeeded William Erly as Roadmaster on the Elk Point and Mitchell Division.

Chicago, St. Paul & Kansas City.—The following appointments have been made in the freight department: Henry Cassidy to be Traveling Freight Agent in Missouri, with office at St. Joseph, Mo.; Frank Cassidy to be General Traveling Freight Agent, with headquarters at the Phenix Building, Chicago; J. S. Winnett to be Division Freight Agent, with office at the Kirkwood House, Des Moines, Ia.; J. F. McFarlane, to be General Agent of the Freight Department, with headquarters at 215 Wood street, Pittsburgh, vice J. S. Winnett, promoted; and J. S. Cox to be Traveling Freight Agent in Ohio.

Cleveland, Cincinnati, Chicago & St. Louis.—The office of Assistant to the President has been formally abolished. Mr. Joseph Ramsey, Jr., held that office in addition to his duties as General Manager. It was the position to which he was appointed when he first became connected with this company.

Choctaw Coal & Railway Co.—Alan H. Reed, of Philadelphia, has been elected Vice-President of this company, in place of John N. M. Shimer.

East & West of Alabama.—J. J. Calhoun, previously General Freight and Passenger Agent, having resigned, all communications referring to that department should be addressed to Charles P. Ball, Receiver and Manager, Cartersville, Ga.

Fort Worth & Denver City.—The annual meeting was held in Fort Worth, Tex., March 2. The following directors were elected: Morgan Jones, G. M. Dodge, J. P. Smith, G. P. Meade, W. T. Walters, J. M. Brown, F. L. Ames, E. W. Taylor, Sidney Dillon. Following are the officers: Morgan Jones, President; G. M. Dodge, Vice-President; S. H. H. Clark, Second Vice-President; W. A. Ross, Secretary; J. G. Jones, Treasurer.

Georgetown & Western.—The annual meeting of the shareholders was held at 449 Broadway, New York City, March 8. The old Board of Directors was re-elected. Frederick Booss was re elected President, Henry Grasse, Vice-President; Charles W. Booss, Secretary and Treasurer, and T. W. Brightman, of Georgetown, S. C., Auditor.

Grand Rapids & Indiana.—The annual meeting of the company last week resulted in the re-election of the old Board of Directors, except that J. H. Hughart was chosen to fill the vacancy caused by the death of the Hon. S. S. Cobb, of Kalamazoo.

Great Northern.—Thomas J. Hyman, has been appointed Assistant to the President. He will, under the direction of the President, take charge of the general work of the office, and particularly in connection with matters of operation, revenue and disbursements.

Greeley, St. Vrain & Denver.—The incorporators are Hon. John M. Wallace, Hon. J. L. Brush, Bruce F. Johnson, Judge James C. Scott, Daniel Hawks, Charles H. Wheeler, Fred E. Smith and E. H. Benton. The following directors have been elected: David Boyd, Henry N. Devotie, Burton D. Sanborn, William Mayher, John A. Rankin, Bruce F. Johnson, Harry C. Watson, Richard Patterson, James C. Scott, Horace G. Clark, all of Greeley, Col., and George H. Young, of Evans, Col. The principal office is at Greeley.

Hamilton & Kingston.—The following are named as directors in the new charter filed in Missouri: Frank Clark, H. Lilley, John M. Morton, D. G. McDonald, J. H. Bathoff, S. C. Rogers, C. L. McLean, E. H. Johnson.

Hoosac Tunnel & Wilmington.—New officers of the road are: J. W. Stiffler, Assistant Superintendent, with office at Readsboro, Vt., and W. B. McClellan, General Passenger Agent, with office at Wilmington, Vt.

Illinois Central.—The following changes have been announced: J. G. Mann appointed Assistant Chief Engineer, and assigned to the Chicago division and Southern lines, with headquarters at Chicago. David Sloan, Assistant Chief Engineer, has been assigned to the Amboy, Springfield and Pontiac Divisions and the Western lines, with headquarters at Chicago. O. M. Dunn has been appointed Superintendent of the Southern lines, vice J. G. Mann, assigned to other duties.

L. T. Moore, previously Chief Engineer, has been appointed Consulting Engineer, with office at Chicago. Ill.

International & Great Northern.—Jay Gould and George J. Gould were elected directors on March 5, in place of Messrs. Cross and Eddy. A. R. Howard, Cashier of the road, was elected director in place of B. W. McCullough, deceased. The board elected Jay Gould President.

Kansas City, Nevada & Fort Smith.—Fred Weld, Sr., has been appointed General Freight and Passenger Agent, with office at Kansas City, Mo. Mr. R. F. Kinnario has been appointed Auditor of this company, vice J. C. Telfer resigned, with office at Kansas City.

Kentor, Elbon & Shawmut.—The President of this new Pennsylvania road is B. E. Cartwright, and the directors are D. Dolliver, W. H. Newton, C. A. Tucker, H. A. Miller, John W. Hall, Alfred Herdman and H. W. Childs, all of Ridgway, Pa.

Lake Shore & Michigan Southern.—J. E. Hull has been appointed Northwestern Passenger Agent, with offices at St. Paul, vice J. H. Willoughby, deceased. The appointment takes effect March 15.

Missouri, Kansas & Eastern.—The following officers were elected at St. Louis last week: E. C. Simmons, President; Samuel M. Kennard, Vice-President; Lewis C. Nelson, Treasurer; George D. Dana, Secretary. Executive Committee: E. C. Simmons, Chairman; S. M. Kennard, Louis C. Nelson, George D. Dana, Lewis B. Tebbetts.

Missouri Pacific.—The annual meeting of stockholders of the company was held at St. Louis March 8, 316,307 shares being represented out of 474,385 shares. The directors of last year were re elected, as follows: Jay Gould, Sidney Dillon, Samuel Sloan, Russell Sage, John P. Munn, Thomas T. Eckert, A. L. Hopkins, George J. Gould, John G. Moore, D. D. Parmly, Edwin Gould, C. B. Greenley and S. H. H. Clark.

Morristown & Cumberland Gap.—H. E. Drew is now General Manager of this road, and S. T. Emerson is Superintendent, both with offices in Morristown, Tenn.

Newport News & Mississippi Valley Co.—The company has withdrawn from the agreement with the Louisville, New Orleans & Texas for joint traffic officers, which has been in effect two years, and has made the following appointments; B. F. Mitchell, General Freight Agent, will have charge of all matters pertaining to the freight traffic of this company, and W. H. Prouty, General Passenger Agent, will have charge of the passenger traffic, both with office at Louisville. E. W. How has been appointed Traffic Manager, with office at Memphis.

W. E. Morse is now Superintendent, with headquarters at Paducah, Ky., and the office of Assistant Superintendent, previously held by him, has been abolished.

New York, Lake Erie & Western.—R. H. Wallace has been appointed Traveling Passenger Agent, with headquarters at Akron, O.

New York & New England.—The annual meeting was held in Boston, March 8. The following directors were elected by a vote of 171,500 shares out of a possible 233,000 shares: J. A. Bostwick, Thomas Rutter, Henry Hentz, John L. Macaulay, Sidney Dillon, Alexander E. Orr, Charles Parsons, Jr., C. B. Tedcastle, E. V. Cary, New York; Eustace C. Fitz, Charles A. Prince, F. H. Prince, Boston; James Howard, Hartford, Conn.; Geo. M. Landers, New Britain, Conn.; David S. Plume, Waterbury, Conn.; B. F. Vaughn, Providence, R. I.; Aretas Blood, Manchester, N. H., and Arthur Sewall, Bath, Me. Charles Parsons, Jr., C. B. Tedcastle and Aretas Blood take the places of Austin Corbin, Charles Howard and S. A. Carleton. The Board of Directors subsequently elected Charles Parsons, President; F. H. Prince, of Boston, First Vice-President; Charles Parsons, Jr., Second Vice-President, and J. A. Bostwick Chairman of the Board of Directors.

Norfolk & Western.—A. P. Warrington has been appointed Division Freight Agent, Winston-Salem Division, with headquarters at Winston-Salem, N. C. R. C. Stanard has been appointed Division Freight Agent, Durham Division, with headquarters at Durham, N. C. He has been Acting Superintendent of the Lynchburg & Durham.

Pacific Short Line.—The offices of Traffic Manager and Superintendent have been abolished. The duties heretofore performed by the Traffic Manager will be assigned to the General Freight Agent and General Passenger Agent. W. W. Flack has been appointed Train Master in addition to his duties as Car Accountant.

Pan American.—The following directors were elected at a meeting at Victoria, Tex., March 2: George H. Towle, J. S. Anthony, Thomas W. Peirce and J. M. Cropley, of Boston, Mass.; J. M. Fadden, J. J. Welder, J. M. Brownson and W. Davis, of Victoria, and R. J. Kleberg, of Corpus Christi, Tex. J. S. Anthony was elected President, Thomas W. Peirce and George H. Towle, Vice-Presidents. A construction company was also organized, of which George H. Towle was elected General Manager. Thomas W. Peirce was elected General Manager of the railroad company and William Davis General Superintendent of both companies. J. M. Brownson was elected Treasurer and George Vineyard Secretary of the railroad.

Pittsburgh, Akron & Western.—At a stockholders meeting at Akron, O., March 2, the following directors were elected: James D. Callery, Jr., Pittsburgh; William Semple, Allegheny; W. V. McCracken, New York City; W. A. Lynch, Canton, O.; D. E. Hill, A. L. Conger and Lewis Miller, Akron, O; C. W. Risley, Delphos, and J. H. Sample, Granville, O. The directors elected officers as follows; President, W. A. Lynch; Vice-president, A. L. Conger, General Manager, W. Semple, Jr.; Superintendent and Secretary, C. W. Risley; Chief Engineer, J. H. Sample; Treasurer, F. M. Semple.

Quanah & Oklahoma.—The first Board of Directors are: G. M. Dodge, of New York; S. P. Knott, of Quanah, Tex.; J. S. Clarkson, of Des Moines, Ia.; M. Jones, of Fort Worth, Tex.; T. Jensen, of El Reno, and D. M. Ross of Guthrie, Ind. Ter.

Red River Valley.—The following officers have been elected for this company, chartered in Minnesota in January: E. R. Jacobi, of Grand Forks, N. Dak., President; J. J. Hall, St. Paul, Minn., Vice-President; C. W. Peterson, Treasurer; T. A. Sullivan, East Grand Forks, Secretary.

Rio Grande Western.—J. E. Hubbard, Superintendent of Bridges and Buildings, has resigned, and the office has been abolished, the department being consolidated with that of the Chief Engineer.

St. Louis, Iron Mountain & Southern.—The annual meeting of stockholders of the company was held at St. Louis March 8, 257,669 shares being represented out of 257,808 shares. The directors of the last year were re-elected as follows: Jay Gould, George J. Gould, Russell Sage, George W. Allen, S. H. H. Clark, Samuel Shethar, John T. Perry, Henry Whelen, A. L. Hopkins, Duncan D. Parmelee, R. J. Lackland, L. H. Roots, Victor Morowetz.

St. Louis, Keokuk & Northwestern.—L. F. Goodale has been appointed Chief Engineer of this line and of the Chicago, Burlington & Kansas City, with office at St. Joseph, Mo., vice E. M. Gilchrist, assigned to other duties.

Silver Lake.—C. A. Carmichael is Superintendent of this road, with office at Perry, N. Y.

Wilkesbarre & Eastern.—The Directors are F. W. Hallenbach, George A. Bedford, W. P. Ryman, F. C. Sturgis, E. Troxell, A. S. Orr and J. E. Hartwell, all of Wilkesbarre, Pa.; Charles B. Capp, New York City, and Dewitt H. Lyon, Greenwich, Conn. W. P. Ryman is President.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

Aberdeen & Victoria.—Local committees at Aberdeen, Wash., on Gray's Harbor and at other points on the southern end of the line, are securing right of way. Several offers are reported to have been made to undertake the construction of the line from Aberdeen north to Victoria, B. C. The farmers in the Quiniault, Queets, Wishkah and Hoquiam Valleys are granting right of way for the construction of the road.

Adirondack & St. Lawrence.—J. E. McIntyre, of Buffalo, and R. E. McIntyre, of Scranton, Pa., have the contract for the trestle work on about 80 miles of this road, and a sub-contract for a small section of grading.

Arcadia, Gulf Coast & Lakeland.—The branch from Braidentown, Fla., south to Sarasota, a distance of 13 miles, has been opened for traffic. The grading on this part of the road was begun in January. It is the western section of the main line which is to extend from Lakeland, Fla., southwest to the Gulf of Mexico, below Tampa Bay, near Sarasota, and which is under contract to Gaboury, Armstrong & Co., of Rome, Ga.

Atlanta.—The Western & Atlanta has made a proposition to lease the new railroad being built by the city of Atlanta. The line is about 1¼ miles long, extending from a connection with the Western & Atlantic in Atlanta to the Chattahoochee River. The grading was begun last month by Briere & Russell. The Western & Atlantic will lay the track on the graded roadbed and complete it for operation if the city will give it a lease for 25 years.

Austin & Northwestern.—The cross ties have been distributed for a number of miles on the Llano extension west of Fairland, Tex., to near the Colorado River, and the tracklaying will probably begin next week. Part of the rails have been delivered at Fairland. Some of the iron work for the bridge over the Colorado River has also been received. All the subcontracts have been let and the grading is in progress on the entire extension.

Baltimore, Canton & Point Breeze.—A charter for this company was filed in Maryland last week. The capital stock is $100,000. The incorporators are Robert Baldwin, John S. Lusk, Wm. R. Cole, J. Vernon Campbell and Harry W. Rusk. The termini are Baltimore City and Canton, Baltimore County, with a branch to Point Breeze, in the twelfth district of the county.

Bayfield, Lake Shore & Western.—An election will soon be held in Bayfield County, Wis., on a proposition to vote this company $50,000 of the county bonds. The company proposes to construct a line from a point on Lake Superior, near Bayfield, northerly and westerly to the East Fork of Sand River, and thence southwesterly through Douglas County to the Minnesota State line. R. D. Pike, of Bayfield, is President, and W. W. Downs is Secretary.

Blue Ridge Springs & Fincastle.—This company, which recently applied to the Virginia legislature for a charter, proposes building a road to connect the Norfolk & Western with the Fincastle & Troutville or Roanoke, Fincastle & Clifton Forge, now under construction. E. B. Grubb, W. N. Mitchell, P. F. Brown and others are the incorporators.

Burlington & Missouri River.—H. M. Haynes, who has been engaged in construction work in New Mexico, tells a Denver reporter that he has a contract for grading part of the Helena extension, and is now removing his grading outfit to the northwest. He further reports that over 500 teams and 2,000 men are now at work on the line, a force which will be increased very shortly to 1,000 teams and 4,000 men. It is probable that Mr. Haynes is referring to the line which is being extended this year 40 miles beyond Gillette, Wyo., and is gradually approaching Buffalo and Sheridan near the Montana state line. But that this line is a Helena extension is premature, and it could not be built to that town without heavy work through a mountainous country south of Helena.

A press dispatch reports the letting of a contract for the extension of a branch through the Black Hills in South Dakota to Kilpatrick Bros. & Collins, of Beatrice, Neb. The proposed line will be 25 miles long, and will take the road from Edgewood station, ten miles south of Deadwood, S. D., through the Bald Mountain and Ruby Basin mining districts to Spear Fish. Over 2,000 men will be given work on the grading within ten days.

Canadian Pacific.—The Winnipeg Board of Trade and other local associations have asked the officers of this company to extend the Stonewall Branch, which is now in operation for about 20 miles north of Winnipeg, in a northerly direction for about 20 miles, this year. It is said that the section which would be reached by the new line is being rapidly settled and raised over 150,000 bushels of wheat for export last year.

Carson & Colorado.—A new charter for the company was granted in California last week. A reorganization has been recently made without change of name. The company operates 300 miles of narrow gauge road in California and Nevada. The talk of an extension south of Keeler to Mojave, Cal., has been renewed.

Chicago, Evansville, Henderson & Bowling Green.—Oliver Ferguson & Son, of Bedford, Ind., are reported to have been awarded the contract for building this road from Evansville, Ind., to Bowling Green, Ky., a distance of 100 miles.

Chicago, Lake Geneva & Northwestern.—The company filed articles of incorporation with the Secretary of State at Madison, Wis., last week, for the proposed line from Lake Geneva to Madison, a distance of 70 miles, connecting with the Chicago & Northwestern. The road will extend through Lake Geneva, Delavan, Lake Koshkonong, and Fourth Lake resort. The capital stock of the company is $2,000,000.

Chicago, Milwaukee & St. Paul.—Several towns in South Dakota have recently asked that branches be constructed to give them rail connection with this system. The local papers are now printing the following letter as the reply addressed by President Miller to a resident of Mound City: "It is impossible for us to extend any of our lines in the Dakotas this year. The road we already have has been so great a burden that it has been somewhat discouraging and we must wait for more development of the country."

Chicago & Northwestern.—General Manager Whitman has assured a local committee of projectors that if a road were built from Dubuque south to a connection with the Chicago & Northwestern at Maquoketa, Ia., the company would lease it for 20 years for a proportion of the gross earnings. The distance is 55 miles. The work of organizing a company to build the road will now be undertaken at Dubuque.

Chicago, Rock Island & Pacific.—J. C. Ferris, of Denver, Col., has secured a contract for grading about 35 miles of the extension being built south of Minco, Ind. Ter. It is stated that 180 miles of the extension is now under contract. This is 80 miles more than was reported to us two weeks ago.

Chicago & South Side Elevated.—The contract has been let to the Keystone Bridge Co. for the iron work for an extension of the elevated line five miles from its present terminus southerly and easterly to and through the World's Fair grounds at Jackson Park. The contract includes over 9,000 tons of structural steel.

Cleveland, Wooster & Muskingum Valley.—Engineers of the Baltimore & Ohio are again reported to be surveying for an extension of this line south of Wooster through the Killbuck Valley to Millersburg, O.

Coal River Valley.—The engineers have begun the surveys south of St. Albans, W. Va., and it is expected to have about 20 miles of the road from that town completed this year. A survey has already been made from the Kanawha River at St. Albans south up the Coal River a number of miles. The terminus of the line is to be at Oceana, connecting with the Norfolk & Western. The route is through a well timbered country, underlaid with bituminous coal. It is proposed to issue $400,000 of six per cent. first mortgage bonds. S Fulton, 28 Bullitt Building, Philadelphia, is one of the directors.

Denver, Lakewood & Golden.—Orders have been recently placed for a large amount of rails for the extension of the line, and Samuel Newhouse, president of the road, is reported as follows: "We will go right ahead now and push the work of building the road into Denver from its present terminus on the West Side. This work and the Villa Park branch will be completed by April, and the Lookout Mountain line will not be very far behind them. A branch will also be constructed to the mines of the Denver Coal Company on Ralston Creek. This is expected to be in running order in a very short time.

Denver & Rio Grande.—A renewed effort is being made by the local interests to induce the managers to extend the road from Littleton to Fort Logan, Colo. It is proposed that the line be built a couple of miles south of Littleton across the river and make a circuit to connect with the branch line now running to the fort.

Duluth, Messaba & Northern.—If the election at Duluth favors the issuance of $200,000 of bonds to aid the construction of this road, ore docks will be built at once on the north shore of St. Louis bay. Otherwise the terminals and ore docks of the Duluth & Winnipeg in Superior will be used. It is very probable that the election will be favorable, and bids for furnishing the piling for the docks to be located at Duluth have been invited.

Duluth, Red Lake Falls & Northern.—This company, which completed its survey about a year ago, is now purchasing a right of way from the Mesaba range, in northern Minnesota, to Duluth. The road enters Duluth via the valley of Lester River, and is to establish terminals and ore docks on Minnesota Point. The company expects to build 100 miles of road this season.

Duluth, Red Wing & Southern.—General Manager L. F. Hubbard states that the permanent location has been made for 70 miles southwest of Rochester, Minn., to which trains are now running. As soon as the weather will permit engineers will complete the location into Sioux City, Ia. Arrangements for securing the necessary money for this extension have been completed and work will be begun as soon as practicable. The line will cross the Chicago, St. Paul, Minneapolis & Omaha at or near Worthington, the route from that point to Sioux City being between the latter road and the Sioux River.

Duluth & Winnipeg.—This company has agreed to build into Duluth if the citizens of that city will grant right of way from the present line to Rice's Point. It is probable that branches from this line will be built to the west end of the Messabe iron range. H. L. Dresser, of Duluth, is Chief Engineer.

East Louisiana.—The town of Mandeville, La., has voted a tax for the construction of a short branch of this line running north of Lake Pontchartrain. The line will probably be built during the summer.

Everett & Monte Cristo.—The company has been organized in Everett, Wash., and is reported to have arranged to take over the road of the Snohomish, Skykomish & Spokane, and to complete it to Everett and Puget Sound, 15 miles. Two parties of surveyors under Engineers Jasper and Palmer, are now locating the extension from the present terminus near Snohomish, Wash., going up Pilchuck and South Stillaguamish Valleys. A. A. Allen is General Manager.

Fort Worth & Dallas Rapid Transit.—The engineers are surveying near Dallas, Tex., having just made the locating survey between Fort Worth and Arlington, 13 miles. The right of way has been obtained as far as Arlington except in Fort Worth. A construction company is to be organized to construct the 30 miles of road to Dallas. The motive power has not yet been decided, but it will probably be electricity. E. E. Perkins is one of the officers.

Greeley, St. Vrain & Denver.—The charter of the company was filed in Colorado last week to build a road from Greeley via St. Vrain Creek to Idaho Creek station connecting with the Chicago, Burlington & Quincy, thence to Canfield, and to Denver by the most practicable route. The capital stock is $100,000. The survey is being made by T. S. Titcomb, of Denver. It, is proposed to use about 28 miles of a grade made by the Colorado Central in 1873, 20 miles of which is still in good condition, and can be repaired for $300 a mile. The other eight miles could be completed for $4,000.

Hamilton & Kingston.—A charter for this company was filed in Missouri last week for a line between Kingston and Caldwell. It is probably an extension of the 10-mile road now in operation between Hamilton and Kingston, in Caldwell County, the chartered name of which is the Haines Hamilton & Kingston.

Helena & Castle.—Two parties of engineers have been sent out by Gen. W. A. Haven, of Helena, Mont., to survey the proposed road from that city to the promising Castle mines. The principal work of the engineers will be in the Belt Mountains, where they will try to find a feasible pass. A railroad between these points has been talked of for several years. A number of Helena business men have engaged General Haven to survey the line, and he expects to have the work done by May 1. The route is nearly east from Helena across the Missouri River to White Sulphur Springs and Castle, in Meagher County, a distance of about 80 miles. It is expected that a line with a two per cent. grade will be found which will not require much grading. The Helena business men are engaged in raising $200,000 as a bonus for a company which is being organized to build the line. The Valley road, graded for some miles from Helena toward the Missouri River, will probably be included.

Kansas City & Independence Air Line.—The line will be opened for regular traffic this week between Kansas City and Independence, Mo. The line was built last year and is 5.6 miles long. Trains will be run between the towns every two hours.

Ketner, Elbon & Shawmut.—The company was incorporated in Pennsylvania this week by B. E. Cartwright, of Ridgway, Pa., and others. The capital stock is $500,000. The road is to be 28 miles in length, extending from Oyster, Elk County, to the Glen Hazel & Shawmut Railroad in Jones township, also in Elk County.

Mexican International.—The grading has been completed for the new branch road which is to be built from a point on this line near Rio Grande River, a few miles south of Piedras Negras, to the Fuente coal mines, seven or eight miles distant. The ties have been distributed and the tracklaying will be commenced at once.

The station to which trains on the Durango extension are now running is called Lomo, and is, as reported last week, about 14 miles south of Torreon, Mex. The track on the extension is being laid at the rate of a mile a day and about 50 miles are now completed. The distance from Torreon to Durango is 156 miles. The road is not very expensive to construct, except in certain places where the country is rough. For the greater portion the surface is of a rolling nature. It is a rich country, with very good mines, while not a little of the soil is cultivable.

Missouri, Kansas & Eastern.—The organization of the company was completed at St. Louis last week, and the officers expect to soon arrange to commence the preliminary work of construction. The company was recently formed in the interest of the Missouri, Kansas & Texas to build a road from Franklin, opposite Boonville, Mo., to St. Louis, thus furnishing the line with an entrance to that city.

Missouri Pacific.—Press reports state that engineers have reached Rochefort, after surveying from Franklin through Howard County, and are now continuing the line through Boone County. This is on the north side of the Missouri River and can hardly be true, for surveys have been made on the south side between Jefferson and Boonville, about the same distance covered by the first line.

Montana Midland.—The incorporators are said to have already secured the right of way to Castle, Mont., and arrangements are being made for a locating survey. The town of Neihart has been asked for land for station and terminals. The new line will be about 45 miles long, extending from the terminus of the Neihart branch of the Montana Central in a southwesterly direction to the Castle mines.

Montgomery Terminal Co.—The new owners of this road are now extending its tracks through the city of Montgomery, Ala., to effect a connection with the extension of the Savannah, Americus & Montgomery road. As already reported, this company is a reorganization of the Montgomery Street Railway Terminal Co. and has purchased the entire property consisting of warehouses, tracks, rolling stock, etc. of that company which had formerly been occupied by the Central of Georgia and the Western of Alabama as joint terminals. The entire stock of the new company, amounting to $208,000, is owned by the Savannah, Americus & Montgomery. An issue of six per cent. 40-year bonds, amounting to $208,000, has been issued and subscribed for at par by a Baltimore trust company.

Montgomery, Tuscaloosa & Memphis.—The talked of resumption of work on the road has not yet materialized. Mr. Berry, one of the chief contractors, has not been definitely informed regarding the resumption of work, but states, however, that he thinks the outlook for an early beginning of work is bright.

National Railroad of Tehuantepec.—The Mexican Government has given a concession for the completion of this road to a syndicate composed of C. Stanhope, of London; E. L. Corthell, of Chicago, and Joseph H. Hampson, of Kansas City. The work under a former contract was suspended last summer, but operations are now to be renewed and pushed forward vigorously, with the expectation of opening up the route within the next 15 months. The office of the syndicate is 13 San Juan de Letran, City of Mexico. It is the intention of the government to improve the harbors on the Atlantic and on the Pacific.

New Roads.—Marcus Pollasky, of San Francisco, reports that he has been offered a subsidy of $400,000 to build a road between Eureka, Humboldt County, and Red Bluff. The line will be about 125 miles long from Humboldt Bay, southwest to the Southern Pacific, and it will be necessary to diverge from a direct line to avoid the Shasta Mountains. Mr. Pollasky proposes to have a survey begun at once, Eureka and the other towns interested to pay half the expenses. The survey will be made from Eureka to Arcata, thence following the Mad River in a southeasterly direction to the foot of the Shasta Mountains. East of the mountains the route would strike the headwaters of the Sacramento River and follow that down to a junction with the Shasta route of the Southern Pacific at Red Bluff.

A standard gauge railroad will probably be built from Tygart's Station, Ky., on the line of the Newport News & Mississippi Valley road, extending southwest about six miles to a deposit of fireclay owned by the builders, the Portsmouth Fire Brick Co., of Portsmouth, O.

William Farrell has a contract for building a four-mile branch road from Wrightsville into Grant County, Ark.

A survey has recently been made by a firm of lumber dealers for a new road from a point on the Pensacola & Atlantic via Lake View, Green Bay and Wiggins through large tracts of pine forest east and southeast of Andalusia, Ala.

Senator McMillan is reported to be one of the projectors of a road in the Upper Michigan Peninsula, to extend from Peer Point, in Luce County, Mich., on Lake Superior, through Newberry, and thence southeast through Mackinac and Schoolcraft Counties to a harbor near Pte. Seulchoix, about 20 miles east of Manistique, on Lake Michigan.

A road is contemplated from Grayling to Hammond's Bay, Mich., which would open up the timber in Montmorency and Presque Isle Counties, along the Cegooc River.

North Avenue Elevated.—The lower branch of the Maryland legislature has passed the bill authorizing the company to build an elevated structure on North Avenue, in Baltimore. This is practically to confirm the legality of the company's ordinance from the city council, under which a small part of the road has already been built on Guilford avenue. Francis K. Carey, Fielder C. Slingluff, Wm. H. Whitridge and Frederick H. Smith are interested in the company.

Ohio Valley.—W. A. Sheppey, who has the contract to build six miles of the extension from Gracey to Hopkinsville, Ky., has sublet four miles to Donovan & Daly.

Oxford Coast Line.—J. T. Pruden, who has the contract for grading the road east of Oxford, N. C., does not expect to complete the work within four months. The lease to the Seaboard Air Line is said to be for only ten years.

Pan American.—A mortgage has been recorded at Victoria and Refugio, Tex., in favor of the International Trust Co., bonding the road being built south of Victoria, at the rate of $20,000 a mile.

Pennsylvania.—The survey for the branch to Doylestown, northeast of Philadelphia, has been completed to within a few miles of that town. Several routes have been surveyed, but it is thought that the one likely to be adopted is that through Horsham, Newville and Tradesville and crosses the Neshaminy River at Edison, where it will be necessary to construct a large bridge.

The work on the new branch, which is to connect the Chestnut Hill division with the new Trenton branch is making good progress. About 100 men are at present employed at Fort Washington, and work near Chestnut Hill is expected to be commenced soon.

Philadelphia & Reading.—The second track on the East Pennsylvania branch of the road will be extended this year between Blandon and Alburtis, Pa., and on the Lebanon Valley branch between Robesonia and Myerstown, Pa.

Port Angeles & Southern.—Chief Engineer A. J. Blackwood is authority for the statement that bids will soon be advertised for, to clear the company's right of way from Port Angeles, Wash., north to Discovery Bay. Estimates and specifications are now about ready for contracts on that road.

Quanah & Oklahoma.—A new charter was filed at Guthrie, Ind. T., last week. The road is to start from a point between Fort Worth and Dallas, and is to extend through Canadian, Oklahoma, Logan, Payne counties, and the strip to the southern border of Kansas. The general offices are at Quanah, Tex.

Rio Grande Southern.—C. W. Gibbs, Chief Engineer, is in charge of a company of engineers which is now making surveys for a branch from the main line at Hesperus to the coal fields a few miles beyond.

Rockford Terminal.—This company, which was recently incorporated in Illinois, is to build a line from the city of Rockford, Ill., to a point on the Elgin, Joliet & Eastern near the city of Aurora, with a belt line surrounding Rockford, to be at no point more than three miles distant from the State Street Bridge in Rockford. The surveys have not yet been made. D. C. Dunlap, Rockford, is President and Engineer; H. C. Alexander, Vice-President, Chicago; E. H. Marsh, Secretary, Rockford, Ill.; G. F. Penfield, Treasurer, Rockford, Ill.

Savannah, Americus & Montgomery.—Colonel Hawkins, President of this company, told a reporter last week that he was having conferences with the Richmond & Danville officers for the transfer to his road of the branch of the Savannah & Western between Savannah and Lyons, Ga. The branch to Lyons was completed in 1890 by the Central of Georgia at the time that the Savannah, Americus & Montgomery was being extended east of Americus toward Savannah. To avoid the paralleling of the lines between Savannah and Americus a contract was made by which each company agreed not to build beyond Lyons, and to operate the road between Americus and Savannah as a joint line. This arrangement has not proved entirely satisfactory.

Tacoma & Eastern.—Arrangements have been made to continue work on the road from Tacoma to the Mineral creek properties near the base of Mt. Tacoma. The road will extend in the direction of Cowlitz pass. Six miles have been built south from Tacoma, at present.

Velasco & Northern.—The projectors are reported to have made a contract with the company deepening the Brazos Harbor, which is likely to have a favorable effect on the early construction of the road. It is to be built from the Brazos Harbor north along the south bank of the Brazos River to Richmond or Rosenburg Junction, about 50 miles. The survey will be begun in a few days by Beraud & Donaldson. W. B. Munson, of Denison, Tex., is one of the directors.

Virginia Central.—The company has applied to the Virginia legislature for a charter with Thomas F. Bassett, Julian H. Miller, John S. Johnson, William H. Fleming and Martin W. Burns as incorporators. The company proposes building a road from Hampton to West Point, thence to Orange C. H. and Harrisburg.

Virginia Roads.—The following railroad companies have applied to the Virginia legislature for incorporation recently: The Roanoke Terminal, the Bristol & Northern, the Southern Railroad & Loan Co., the Norfolk & Lynnhaven Railroad & Terminal Co., the Virginia Central Railroad & Navigation Co., and the Blue Ridge Springs & Fincastle.

Wabash.—B. F. Johnson & Co., general contractors for the extension from Montpelier, O., to Hammond, Ind., awarded the sub-contracts for the entire line last week, the work being divided among 33 firms.

Wheat Belt & Cattle Trail.—I. D. Burdick, of Carbondale, Kas., is organizing a company, which will soon be incorporated under this name, to construct a railroad through the central part of the Indian Territory and Western Texas. The line will begin near Whitehead, in the Cherokee Reservation, connecting with the branch of the Atchison, Topeka & Santa Fe to Panhandle City, Tex., and will extend in a southwesterly direction through the Territory and across the Red River to Coleman, Tex., on the Gulf, Colorado & Santa Fe, the distance being about 200 miles.

Wilkesbarre & Eastern.—This company, which was incorporated in Pennsylvania this week with a capital stock of $3,000,000, proposes to build a line 70 miles long. It is to extend from Wilkesbarre, where terminal facilities have been secured through Lackawanna County to a point on the Delaware River near Delaware Water Gap, Monroe County, Pa., and will have a grade not exceeding 52 ft. to the mile. It will have control of several large tracts of anthracite coal land.

Wilmington, Onslow & East Carolina.—Recent movements of the engineers have brought up again the likelihood of the extension beyond Onslow, N. C., the present terminus. Kinston and other towns, which would be on the route, are renewing offers of assistance, and Richard Lamb, the Chief Engineer, states that it is certain that the road will be extended.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—The gross earnings, operating expenses (exclusive of taxes and rentals) and net earnings of the road and its auxiliary lines for January, 1892, were as follows:

	Gross earn.	Oper. expen.	Net earn.	Oper. Mileage.
Roads owned and controlled	$2,479,161	$1,970,049	$509,113	6,538
Roads jointly owned, Atchison's one-half	141,434	135,808	5,627	587
Total, Atchison system.	$2,620,595	$2,105,855	$514,740	7,125
St. Louis & San Francisco:				
Roads owned and controlled	$460,648	$317,809	$142,839	1,328
Roads jointly owned, 'Frisco Co.'s one-half	138,885	132,000	6,885	536
Total 'Frisco system.	$599,533	$449,809	$149,724	1,864
Aggregate, both systems	$3,220,128	$2,555,664	$664,464	8,989

The comparative statement for all lines is as follows:

	Gross earnings.	Net earnings.	Per mile.—Gross earnings.	Per mile.—Net earnings.	Mileage.
Atchison system:					
Jan., 1892	$2,620,595	$514,740	$367.78	$72.24	7,125
Jan., 1891	2,473,818	538,711	347.72	75.72	7,114
Inc. or dec.	I. $146,749	D. $23,971	I. $20.06	D. $3.48	11
'Frisco system:					
Jan., 1892	$599,533	$149,724	$321.65	$80.33	1,864
Jan., 1891	613,246	170,173	328.78	91.24	1,865
Inc. or dec	I. 13,717	D. 20,449	D. 7.13	D. 10.91	D. 1
Aggregated general system:					
Jan., 1892	$3,220,128	$664,464	$358.21	$73.91	8,989
Jan., 1891	3,087,094	708,884	343.78	78.94	8,979
Inc. or dec	I. 133,034	D. 44,420	I. 14.43	D. 5.03	I. 10

Atlanta & Florida.—The application before the United States District Court at Macon, Ga., for the confirmation of the appointment of T. W. Garrett, of Atlanta, as Receiver, which has been made by the State Superior Court, was argued last week. The court decided adversely, refusing to revoke the order previously made, appointing R. H. Plant Receiver. T. W. Garrett was appointed Receiver Feb. 9, last, on application of creditors who had begun suit in the State Court early in January. On the same day, however, the Judge of the United States District Court for the southern district of Georgia appointed Mr. R. H. Plant Receiver, upon application of attorneys representing the Western Railway of Alabama. T. W. Garrett is still in possession of the property of the railroad, but the press dispatches state that the judge of the Superior Court has acquiesced in the appointment made by the United States Court.

Baltimore & Ohio.—The Maryland Legislature has passed, by practically unanimous votes, bills to tax the $10,000,000 increase in the common stock of this company, authorized last November, and to compel the Baltimore & Ohio and Northern Central roads to surrender their exemptions from taxations if they connect with the Belt Line Tunnel Road, now being constructed through Baltimore. The bonds of the company have been guaranteed by the Baltimore & Ohio.

Central of New Jersey.—The following is a report for the year ending Dec. 31:

	1891.	1890.	Inc. or Dec.
Gross earnings	$14,653,687	$14,126,563	I. $527,124
Operating expenses	8,526,188	8,161,276	I. 364,892
Net earnings	$6,127,519	$5,965,287	I. $162,232
Other income	897,276	1,160,046	D 262,770
Total income	$7,024,796	$7,125,333	D. $100,538
Fixed charges	4,637,350	4,617,953	I. 19,387
Balance	$2,387,445	$2,507,370	D. $119,925
Dividends	1,455,431	1,117,002	I. 338,330
Surplus	$932,014	$1,390,278	D. $458,264

Central of Georgia.—Gen. E. P. Alexander, President of the road, was appointed temporary Receiver last week on an application made in the Georgia Superior Court at Atlanta by a Charleston stockholder owning about 50 shares of stock. The order appointing a Receiver was made in the night, and no notice

was given to the company's officers of the application for a Receiver or of any hearing. The court will hear arguments for the appointment of a permanent Receiver at Atlanta, March 14. The bill filed with the court attacks the lease to the Richmond & Danville. There seems to be a good deal of mystery connected with the application, and it was even reported that it was a friendly suit, instigated by the Richmond Terminal reorganization committee, but both parties in that company deny all knowledge of the matter.

Chesapeake & Ohio.—Under authority granted at a recent meeting of the stockholders, a general mortgage deed on all its property was recorded in Virginia this week from the company to the Central Trust Co., of New York, and Henry T. Wickham, of Richmond, trustees. It is to secure the payment of $70,000,000 4½ per cent. mortgage bonds for the general uses of the corporation, redemption of bonds, etc., and additional bonds, not to average over $25,000 a mile for the purpose of double-tracking and other purposes.

The railroad reports gross earnings for January of $703,740, an increase of $49,077 as compared with the same month of last year, and net earnings of $154,970, an increase of $2,204. For the seven months ending Jan. 31 the gross earnings were $5,505,705, an increase of $739,434 as compared with the corresponding period of last year, and net earnings $1,458,068, an increase of $153,369.

Chicago, Burlington & Quincy.—The earnings and expenses for January were as follows:

Month of January.	1892.	1891.	In.
Freight	$2,080,300	$1,428,193	$652,102
Passenger	614,163	612,741	1,362
Mail, etc	314,396	288,891	25,505
Total earnings	$3,008,799	$2,329,830	$678,969
Expenses	2,069,210	1,715,081	354,129
Net	$939,589	$614,749	$324,840
Charges	810,000	795,186	14,814
Balance	$129,589	def. $180,437	$310,026

Louisville, New Albany & Chicago.—A statement has been prepared for the half year ending Dec. 31, showing that the total earnings in that period were $1,568,066, and the operating expenses $1,095,569, leaving the net earnings $473,598.

New York, Lake Erie & Western.—It is reported from Philadelphia on very good authority that this company has concluded friendly arrangements with the Philadelphia & Reading since the leases of the Lehigh Valley and Central of New Jersey.

The financial statement for the month of January is as follows:

	1892.	1891.	Inc or dec.
Gross earnings	$2,186,570	$2,172,279	I. $ 14 291
Oper. expen	1,732,333	1,595,027	I. 137,306
Balance	$454,237	$577,252	D. $123,015
Due leased lines	180.572	189,551	D. 8,879
Net earn	$273,665	$387,891	D. $114,136
Oct. 1, to Jan. 21:			
Gross earn	$10,386,301	$9,777,076	I $609,225
Oper. expen	7,219,645	6,631,968	I. 587,677
Balance	$3,166,656	$3,145,108	I. $21,548
Due leased lines	897,514	889 590	I. 7.924
Net earn	$2.269,142	$2,255,517	I. $13,624

New York & New England.—The proposal made by the directors at the annual meeting in Boston, March 8, for a new issue of bonds was passed after some opposition from the minority stockholders. The motion on which the vote was taken was "to authorize the issue of 50-year five per cent. bonds to an extent that may be authorized by law, secured by all the company's franchises and property, the directors to apply for the necessary legislation and to dispose of the bonds for the company's interest." One of the stockholders asked for a statement as to the purpose for which the bonds were to be issued and was answered that the directors wished to retire the higher rate bonds, the preferred stock, and double track the western division. An amendment was moved that the amount be limited to $3,000,000 above what will be necessary to retire outstanding bonds and preferred stock, but this received only a few more than a thousand votes, the directors voting over 171,000 shares of the stock.

J. L. Macauley, a member of the executive committee, said after the meeting that the directors cannot tell the amount of bonds that may be issued. For instance, in Connecticut they cannot, under the law, issue more than 50 per cent. of the cost of the road, and must first show the cost of the property. They will double track to Hawleyville from New Britain immediately. The largest stockholder, he says, is J. A. Bostwick, who has 35,000 shares; W. H. Starbuck has 8,000 shares, of which 5,000 are in his name. Charles Parsons has 10,000 shares, and will buy more. Austin Corbin had 3,000 shares in his name and claimed 8,000, but he has sold out.

New York, Ontario & Western.—The directors have prepared a financial plan which will be submitted to the stockholders April 20, and is intended to provide for the refunding of the outstanding bonds and for improvements. The proposition is to authorize the execution of a mortgage, under which $20,000,000 four per cent. 100-year bonds may be issued from time to time, of which $5,500,000 will be used to retire the $4,000,000 six per cent. bonds, which are redeemable at 110. Seven million dollars will be held to retire the $5,600,000 consolidated fives, and the remainder issued from time to time for improvements, including docks and coal trestles at Cornwall and new equipment.

Norfolk & Western.—A preliminary annual statement has been made for the year ending Dec. 31. The gross earnings were $9,188,042, the operating expenses $6,009,767, and the net earnings $3,334,920. The total income was $3,469,920, including a special dividend fund of $270,000 for two years' dividends on the preferred stock of the Shenandoah Valley road. The interest charges were $2,266,131, and two 1¼ per cent. dividends amounted to $1,072,500, the surplus for the year being $131,290, and the total surplus $1,586,552, from which is to be deducted $129,575 for sinking fund. The freight earnings were $7,000,316, an increase of $650,925, or 10 per cent. over 1890: passenger earnings were $2,097,726, a decrease of $39,997; total gross earnings were $9,188,042 in 1891, as compared with $8,577,114 earned in 1890, an increase of $610,927. The operating expenses increased $342,685, or six per cent. over 1890. the net earnings, $3,178,274, being in comparison with net earnings of $2,910,032 in 1890, the increase, $268,243, being equal to nine per cent.

The Lynchburg & Durham, extending from Lynchburg, Va., south to Durham, N. C., 114 miles, which was recently leased by the company, will be operated as the Durham Division, and the Roanoke Southern will be operated as the Winston-Salem Division.

Northern Pacific.—The gross earnings for February amounted to $1,953,848 in 1892 against $1,796,483 in 1891, an increase of $157,365. The mileage operated in February, 1892, was 5,199 miles, 140 more than in the previous year.

Pennsylvania.—The annual meeting was held in Philadelphia March 8. President Roberts addressed the stockholders upon the policy of the company and its fostering of the commercial interests of the State of Pennsylvania and the city of Philadelphia. A resolution was passed authorizing the Board of Directors to issue at its discretion the 350,000 shares of unissued stock for the purpose of improvements to the company's property. The election for directors will take place March 13.

Pittsburgh, Akron & Western.—This road was under the nominal control of a Receiver for about two days last week, though he was not in actual possession. Walter B. Ritchie, of Lima, O., was appointed Receiver in a suit for a debt incurred in the construction of the road, but the appointment was canceled on the representation of the company's officers that notice of the hearing had not been given them.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, March 9, 1892.

The agreement to abide by the order of the Kansas Commissioners in regard to fifth class rates from the Missouri River to Witchita, Salina, Hutchinson and Arkansas City, and the withdrawal by the Atchison and Missouri Pacific of their compromise tariff does not appear to have entirely settled the question. The Rock Island now claims that it cannot legally reduce fifth class rates without also reducing fourth class rates, which cover l. c. l. rates on the same merchandise taking fifth class in c. l. lots. The other roads are disinclined to do this, and it is now reported that the Commissioners have ordered that on and after March 16, the rate on sugar, carload lots, from Fort Scott, Kansas City, Leavenworth and Atchison shall be 15 cents per 100 lbs., and that in place of the order of Jan. 6, reducing the rate on the fifth class, a commodity rate must be used after March 16, on canned goods, coffee and beans, in carload load lots, of 22 cents to Salina, 25 cents to Hutchinson and Wichita, and 28 cents to Arkansas City.

Reports are current that some of the Eastern lines are again cutting eastbound grain and flour rates, presumably to curry favor with shippers prior to the opening of navigation.

Supt. Carman, of the Western Railway Weighing Association and Inspection Bureau, has issued the following notice: "I understand that efforts are being made by stove manufacturers, especially those at points west of Chicago and St. Louis, to get their shipments of stoves through at net rates, paying no charges on the weight of the lumber used for crating or blocking. There is no rule by which this material is carried free, and you are instructed to carefully examine all shipments of stoves, in car lots, and to see that the actual weights of the contents of the cars are charged for."

The Wisconsin Central has given notice to the Western Passenger Association that hereafter it will not participate in the expenses of arbitrations on matters appealed from decisions of the chairman in which it is not a party. This position is the outcome of an agitation among a number of the members who have for some time objected to so many appeals being taken, claiming that if each road had to pay the expense of arbitration of its appeals, questions of minor importance would not so often be appealed.

The Commissioners of the Western Traffic Association have promulgated their decision upon the questions arising from the action of the Union Pacific in filing notice of its proposed withdrawal from the Colorado-Utah association. On Dec. 18, 1891, the Commissioners announced a decision in respect to the proposed withdrawal of certain Colorado and Utah traffic from the Western Traffic Association, among which was the traffic covered by the Colorado-Utah traffic association, namely, all traffic, freight and passenger, originating at or destined to Colorado and Utah common points. In this decision they gave their consent to the withdrawal of the traffic in question, making it conditional upon the filing with the Board of the new agreement duly signed by all the General Managers. Subsequently they were informed by the Union Pacific that that company had declined to sign the agreement and did not desire longer to remain a member of the Colorado-Utah Association. Consequently, all the interested members not having agreed upon the matter as was necessary under the by-laws of the Western Traffic Association in order to enable the traffic to be withdrawn from the jurisdiction of the latter association, and there being no provision for the removal of traffic upon the application of a part only of the interested members, and the agreement upon which the former action of the Commissioners was based having failed to become operative by reason of the withdrawal of the Union Pacific therefrom, the Commissioners now rule that there remains no agreement of the interested lines upon which they can act or under which the traffic can be withdrawn from the Western Traffic Association. It necessarily follows that the traffic in question still remains subject to the jurisdiction of the Western Traffic Association and belongs to the Trans-Missouri Division, where it had been assigned previous to any attempt to remove it. They further announce that having been advised that the matter will be appealed to the Advisory Board for determination they will suspend action pending such appeal.

The Chicago *Tribune* has a page of interviews with shippers and railroad commissioners in Missouri, Kansas, Iowa, Nebraska and Minnesota, the gist of which is that the interstate law is a practical failure: that all roads pay rebates to favored shippers. Some of the parties alleged to be favored by the several roads are named. The situation is said to be worse in Kansas than anywhere else.

It is reported that the Baltimore & Ohio and the Pennsylvania have agreed to restore passenger fares between Columbus, Chicago and St. Louis to full tariff on March 15. Fares from Columbus, O., and a good many smaller places to Chicago, and vice versa, have been two or three dollars off for some weeks.

Traffic Notes.

A shipment of 18,000 bushels of corn is reported as having been sent from St. Louis to Mexico, via Mobile and the "Tampico route," a steamer line running from Mobile, which has lately been established.

A Rochester paper says that the shipments of soft coal over the Buffalo, Rochester & Pittsburgh and the New York Central to New England points are now very heavy. The Bell, Lewis & Yates mines turn out 12,000 tons daily, most of which goes to New England.

The last quarterly report of Commissioner E. E. Hill, of the Colorado Car Service Association, shows 49,000 cars handled, with an average detention of 1.97 days. About three-fifths of these cars were handled at Denver, where, it will be remembered, the demurrage charge is only 50 cents a day.

The Southern Pacific has recently taken two cars of bananas from New Orleans to San Francisco in less than seven days, this being the first shipment of such fruit by rail to San Francisco. The city has heretofore been dependent for this fruit on shipments received by steamers, which come at long intervals.

The large shippers of Sioux City, Ia., are taking steps to form a traffic association, in which they will try to enlist the co-operation of other Missouri River cities. It is said that they have engaged the services of Mr. J. V. Mahoney, who lately resigned the office of Traffic Manager of the Sioux City & Northern Railroad.

The Texas Railroad Commissioners have informed the Fort Worth & Rio Grande that they will allow that road to increase its freight rates 10 per cent. The Commission has issued a circular giving permission to the roads of the state to adopt any classification ruling issued by the Western Classification [Freight?] Association without a special order from the Commission.

A number of independent oil producers have sent a complaint to Governor Pattison, of Pennsylvania, asking that the Pennsylvania Railroad and the National Transit Co., which operates a pipe line to the seaboard, be proceeded against in the courts for combining to keep up the rates on oil. It is said that an agreement between the companies guarantees the railroad 26 per cent. of the oil traffic from the region served by these companies. The petition is signed by the Producers' Oil Company, Limited, the Producers' Protective Association, the Independent Refiners' and Shippers' Association, 20 other independent refiners and many prominent producers.

Freight Claim Association.

Representatives of the Eastern and Western Freight Claim Agents' Associations, together with representatives of the lines south of the Ohio River, met at Chicago, March 3 and 4, and effected an amalgamation of the existing associations and the lines south of the Ohio River, under the name "The Freight Claim Association." The session on March 3 was devoted to the perfecting of details, formulation of by-laws and rules, etc. The committees reported March 4 and the proposed by-laws and rules were adopted and the following officers elected: President, F. D. Howell, Pennsylvania; First Vice-President, A. T. Drew, Missouri, Kansas & Texas; Second Vice-President, C. W. Eldredge, Louisville, New Orleans & Texas; Secretary, S. A. Mehorter, Pennsylvania; Board of Arbitration, E. Nichols, Delaware, Lackawanna & Western; J. Tipton, East Tennessee, Virginia & Georgia; C. S. Sutton, Atchison, Topeka & Santa Fe.

Grain Shipments from South Dakota.

Chairman H. J. Rice, of the South Dakota Railroad Commission, has made a report to the Governor on the car famine experienced in that state last fall. The summary published in the press dispatches does not give much about the famine, except to say that the railroads and the Commissioners acted harmoniously in trying to mitigate it as much as possible, but there is a summary of shipments which seems to have been compiled with considerable care. This shows shipments of grain from South Dakota, as appears from the books of the various railroad companies doing business in the state for the months of August, September, October and November, 1891, as follows:

	Bushels.
Wheat	15,000,700
Flax	2,587,900
Corn	90,920
Barley	552,519
Oats	1,230,700

Stored in elevators on the first of December, 6,000,493 bushels; estimated amount in hands of farmers on same date, based on careful inquiry and actual figures furnished, 16,000,000 bushels.

Demurrage at Chicago.

The annual report of Manager E. D. Moore, of the Chicago Car Service Association, for the year 1891, shows that 930,875 track cars were reported, the average daily detention being 1.51 days. The report by roads is as follows:

Roads.	Cars reported.	Av. daily detention.	Roads.	Cars reported.	Av. daily detention.
A. T. & S. F.	12,857	1.63	L. S. & M. S.	31,435	1.54
B. & O.	6,690	2.68	M. C	14,153	1.53
C. & A.	19,118	1.32	N. Y. C. & St. L.	3,284	1.83
C., B. & Q.	137 549	1.59	P., C., C & S. L	29,082	1.48
C. & E. I.	47.553	2.16	P., Ft. W. & C.	36.355	1.49
C. & E.	19.380	2.30	Wabash	19,528	1.06
C. & G. T.	5,386	1.75	W. C	17.267	1.95
C. & N. W.	113,924	1.42	C. R. T. Assn.	129.244	1.48
C., M. & St. P.	84,810	1.59	C. & B. I.	31,401	1.27
C., R. I. & P.	56,323	1.39	C. & K.	6,214	1.53
C. & W. I.	17,379	1.86	C. & S. E.	27,062	1.45
C., St. P. & K. C.	11,979	1.35			
I. C.	43,754	1.52	Total	930,875	1.51
L., N. A. & C.	8,539	1 85			

Eastbound Freight Shipments.

The shipments of eastbound freight from Chicago by all the lines for the week ending March 3, amounted to 100,592 tons, against 97,074 tons during the preceding week, an increase of 3,518 tons, and against 71,814 tons during the corresponding week of 1891. The proportions carried by each road were:

Roads.	Tons.	P. c.
Michigan Central	13,133	13.1
Wabash	11.114	11.0
Lake Shore & Michigan Southern	13,785	13.7
Pitts., Ft. Wayne & Chicago	12,302	12.2
Pitts., Cin., Chicago & St. Louis	8,567	8.5
Baltimore & Ohio	6,095	6.1
Chicago & Grand Trunk	12,894	12.8
New York, Chic. & St. Louis	10,422	10.4
Chicago & Erie	8,656	8.6
Other lines	3,622	3.6
Total	100,592	100.0

The three Vanderbilt lines carried 35.4 per cent. and the two Pennsylvania lines 20.7 per cent.

GEO. WESTINGHOUSE, JR., President. T. W. WELSH, Supt. JOHN CALDWELL, Treasurer. W. W. CARD, Secretary. H. H. WESTINGHOUSE, General Manager.

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MANUFACTURERS OF THE

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The WESTINGHOUSE AUTOMATIC BRAKE is now in use on 24,000 engines and 292,000 cars. This includes (with plain brakes) 200,000 freight cars, which is about 20 PER CENT. of the Entire Freight Car Equipment of this country, and about 80 per cent. of these are engaged in interstate traffic, affording an opportunity of controlling the speed of trains by their use on railways over which they may pass. Orders have been received for 140,000 of the Improved Quick-Action Brakes since December, 1887.

The best results are obtained in freight train braking from having all the cars in a train fitted with power brakes, but several years' experience has proven conclusively that brakes can be successfully and profitably used on freight trains where but a portion of the cars are so equipped. Below is a graphical illustration of the progress made in the application of the Automatic Brake to freight cars since its inception

Year.	No. per year.	Grand total.
1881	105	105
1882	1,085	1,190
1883	4,966	6,156
1884	15,051	21,207
1885	10,410	31,617
1886	8,946	40,563
1887	9,281	49,844
1888	27,696	77,540
1889	26,065	103,605
1890	50,502	154,107
1891	39,061	193,168

193,168 freight cars fitted with the Westinghouse Automatic Brake, which is nearly 20 per cent. of the Entire Freight Car Equipment of this country.

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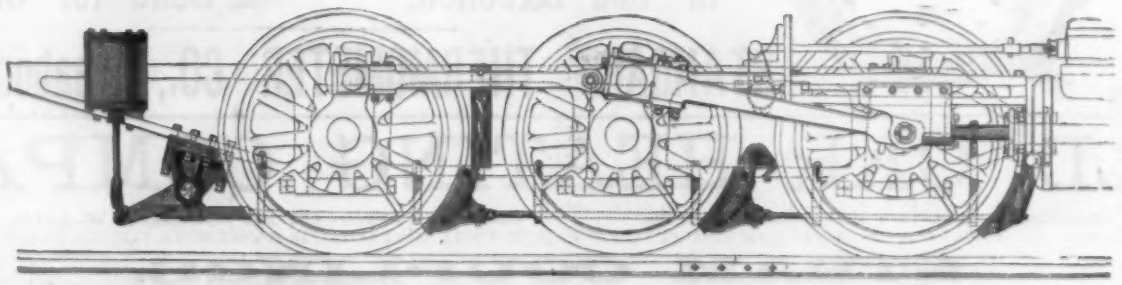
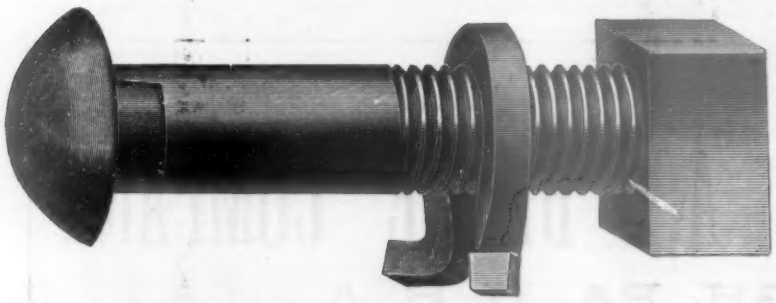


Standard Outside Equalized Pressure Brake, for two or more pairs of Drivers, furnished to operate with either STEAM, AIR or VACUUM.

THE "STANDARD" NUT LOCK



Manufactured under D. O. Ward's Patents by the

STANDARD NUT LOCK CO.,

NOS. 236-248 BANK ST., NEWARK, N. J.

SAMPLES FREE.

This nut lock is presented on its merits as the best and cheapest device for securing track joints.

It is a torsional loop made of good quality of tempered spring steel, having horizontally inclined foot pieces, which are curved inward, thereby greatly increasing the spring resistance and acting simultaneously; rests upon the base of angle bar, or underlying rail base in case of fish plate, preventing the loop portion from rotating and hammering down *thread* of *bolt*.

The nut lock for ⅝ bolt made of ½ in. square steel, standard pattern, yields a tension of 4,300 lbs. on the bolt, which is sufficient to reduce the wear of the bearing surfaces of the angle bars on the rails, imparting, as it does, a uniform bearing the entire length of the bar.

The "Standard" Nut Lock has sufficient elasticity to maintain a tight joint, which cannot be truthfully said of many light-weight single coil washers.

The "Standard" Nut Lock is, in its superficial form, similar to an annular coil twisted out of plain, i. e., the curved shoulders or ends of the loop proper are spread in the usual manner of spring coils, at which bearing points the locking friction is equal to that of the best single coil washer, and added to this it is terminated in *inwardly curved* extensions, which must apparently furnish additional short leverage spring force of a torsional character.

Distinctive Merits of the "Standard" Nut Lock, Condensed:

Fixedness of position—cannot rotate and hammer down threads of bolt.

Cannot get one end into elongated slot of angle-bar.

Unlike any permanently placed, double washer, the Standard *is* interchangeable regardless of distance between bolts.

Cannot be put on wrong side out, as the outward projection of the foot pieces would prevent the nut being turned up.

Has more spring power directly under the nut than any two ordinary coil nut locks.

Being fixed in position it offers double the locking friction of nut locks, which when in their *dead* "set" condition turn back with nut by the vibrative effect of passing train.

The "Standard" Nut Lock embodies the old principle of spring power improved by overcoming the objection to the double washer or nut lock, and covering the weak points of the single coil washer.

Excelsior Automatic Nut-Lock and Fish Plate Spring

These Nut Locks have been adopted by the New England Road-Masters, in Conventions held at Hartford, Conn., Oct. 19 and 20, 1887, and Boston, Mass., Aug. 15 and 16, 1888, as the best Nut Locks known.

Sample lots furnished for trial, free of expense, by forwarding the distance between centres of fish-plate bolts. Correspondence and orders solicited.

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Patentees and Sole Mfrs., SCHUYLKILL FALLS, Philadelphia, Pa.

Simple. Easily Applied. Very Effective.

THE NATIONAL LOCK WASHER

THE ONLY POSITIVE NUT LOCK IN COMBINATION WITH ELASTICITY.

Sixty Millions in Use in Railroad Track.

For Use on All Kinds and Classes of Work.

Made for all sizes of bolts.

A trial is requested.

Samples free of expense.

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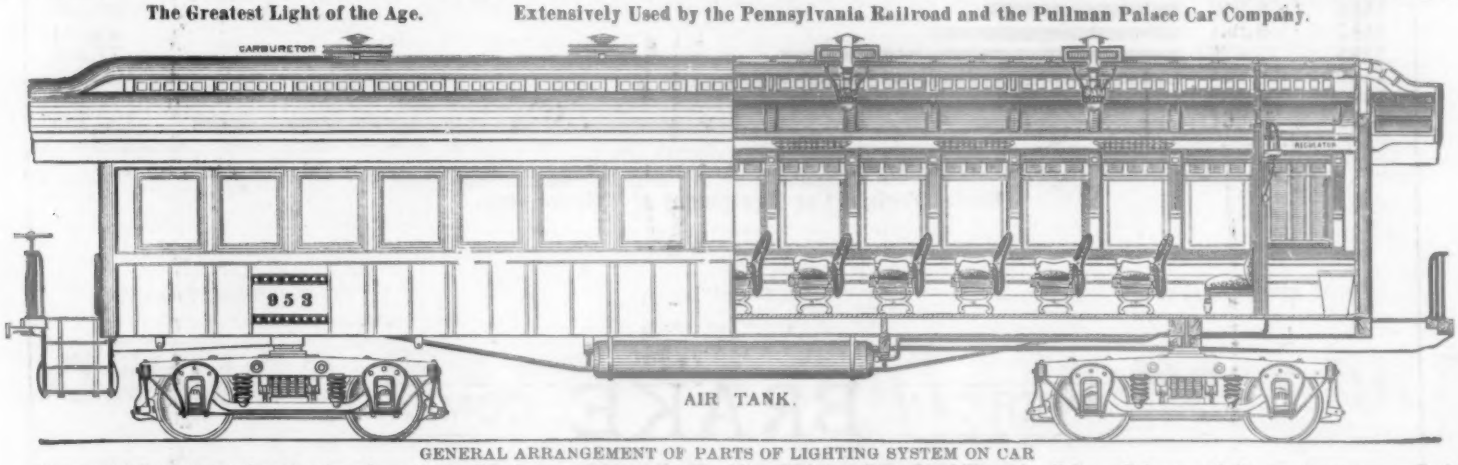
THE FROST DRY CARBURETOR SYSTEM OF CAR LIGHTING.

The Greatest Light of the Age. **Extensively Used by the Pennsylvania Railroad and the Pullman Palace Car Company.**



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Gold's INTERCHANGEABLE, with Gravity Relief Trap.
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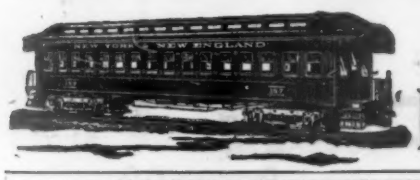

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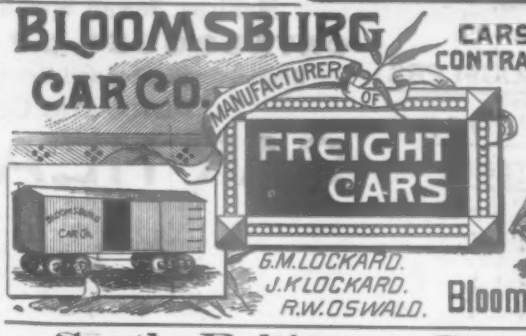

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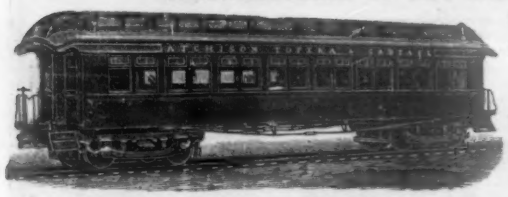

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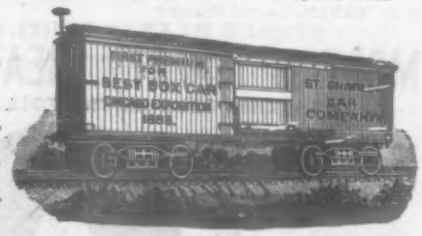

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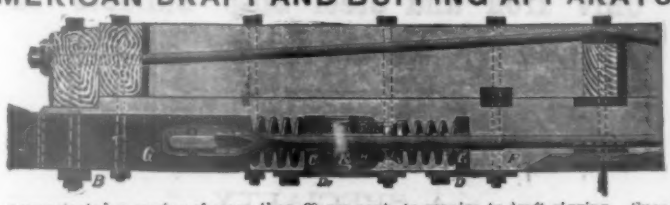

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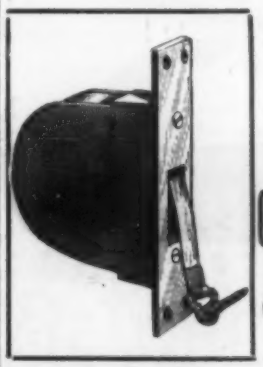

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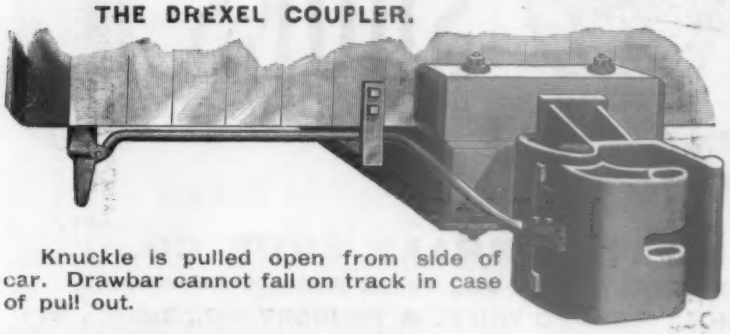

Knuckle is pulled open from side of car. Drawbar cannot fall on track in case of pull out.

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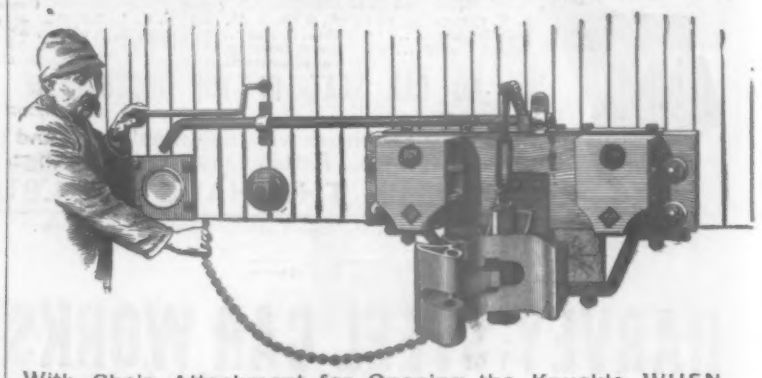

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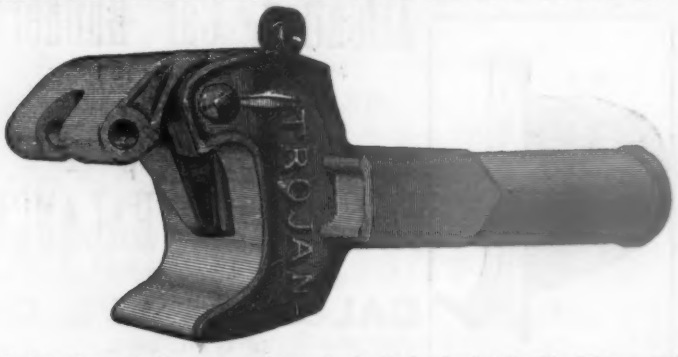

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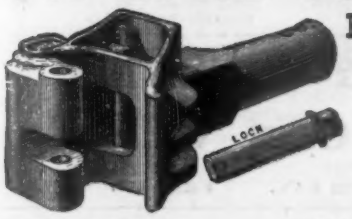

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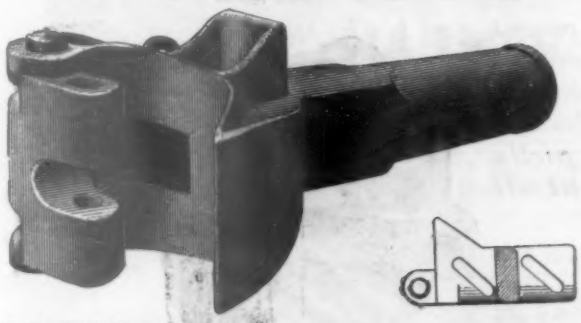

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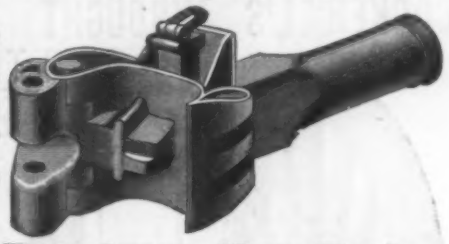

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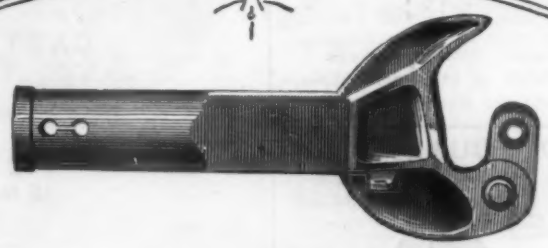

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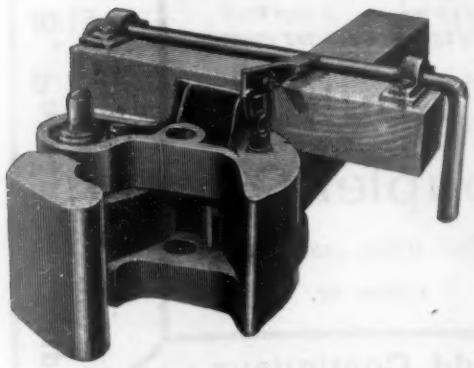

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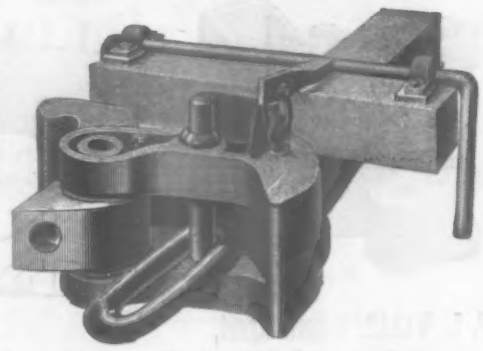

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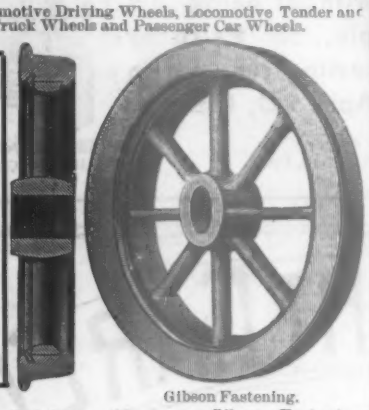

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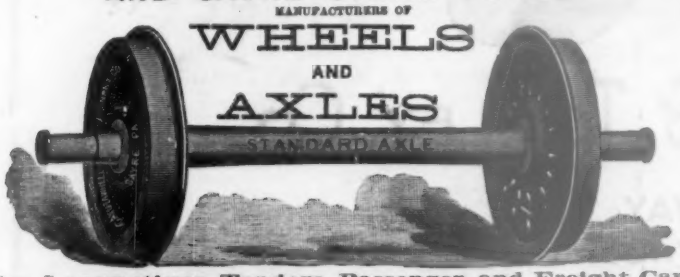

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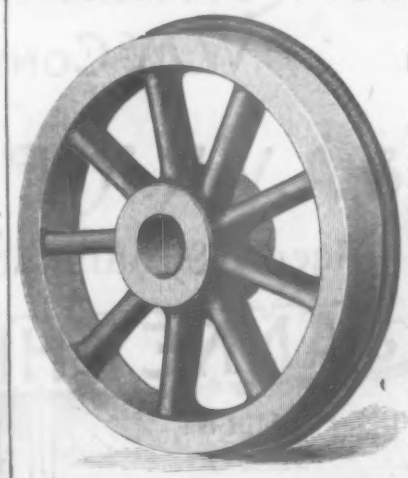

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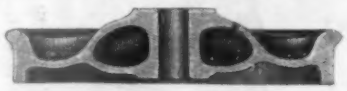

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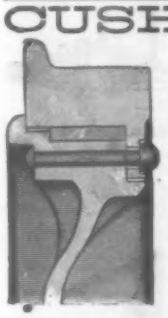

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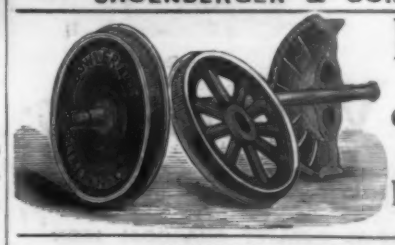

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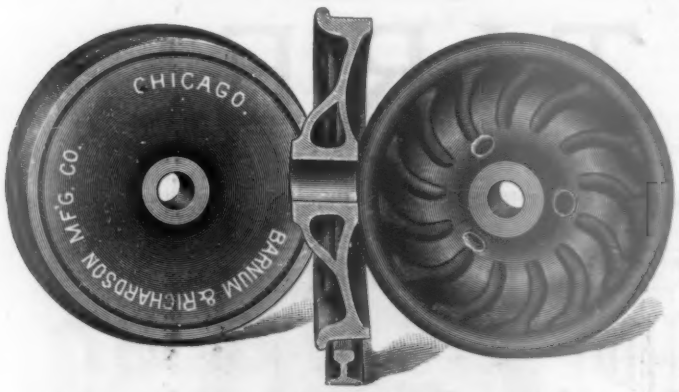

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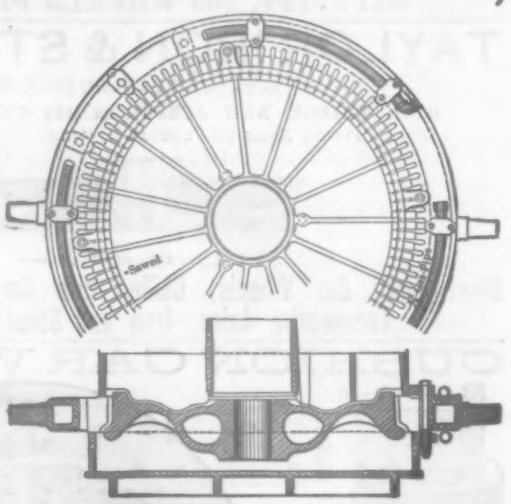

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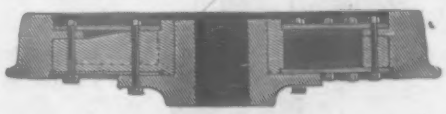

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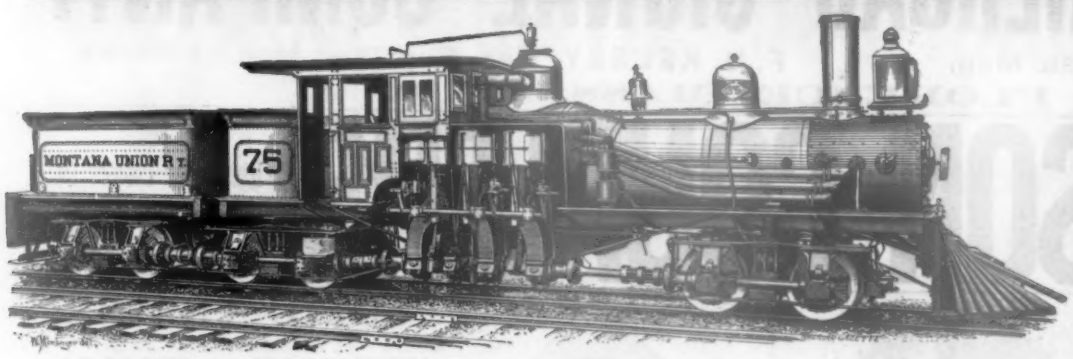

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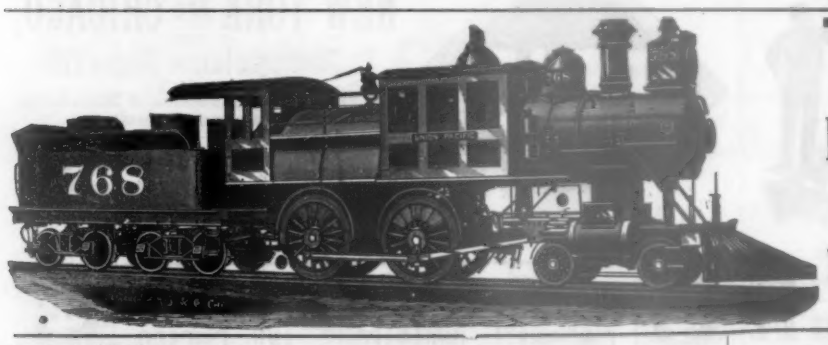

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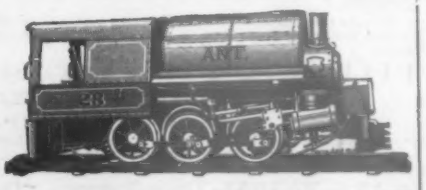

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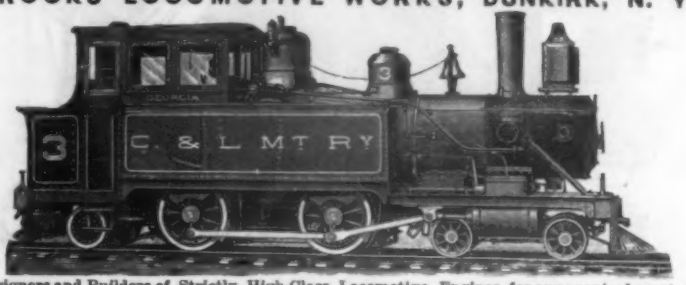

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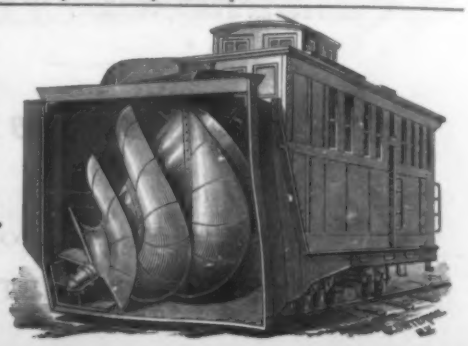

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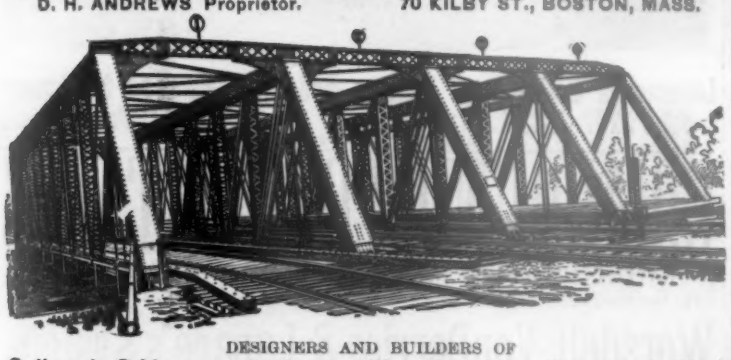

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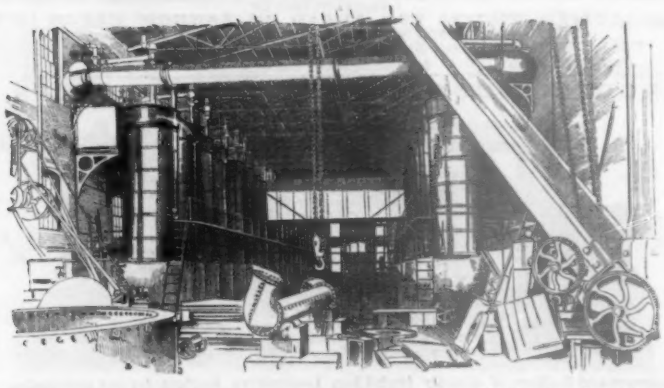

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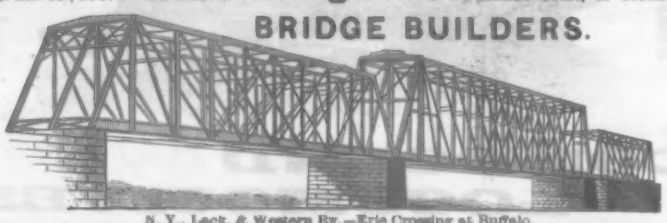

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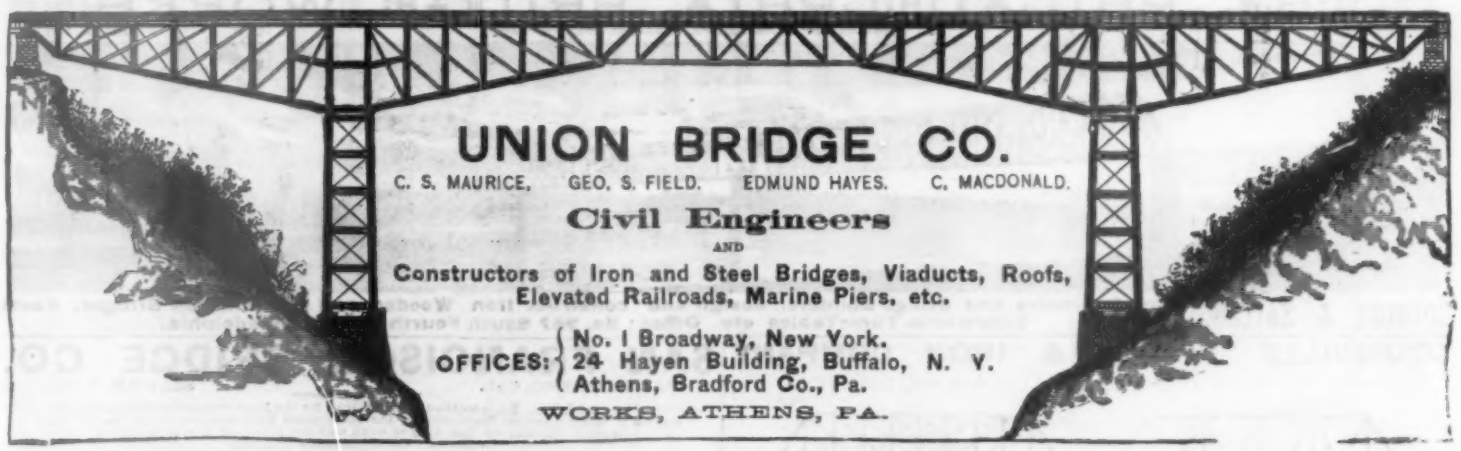

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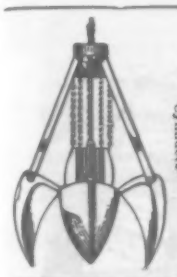

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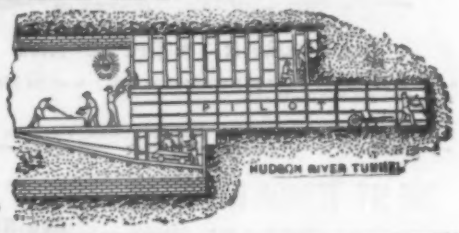

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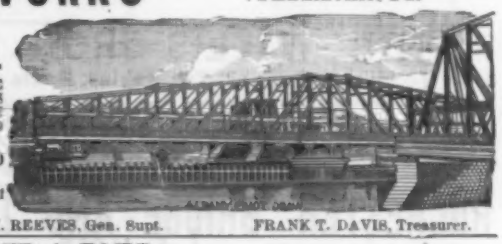

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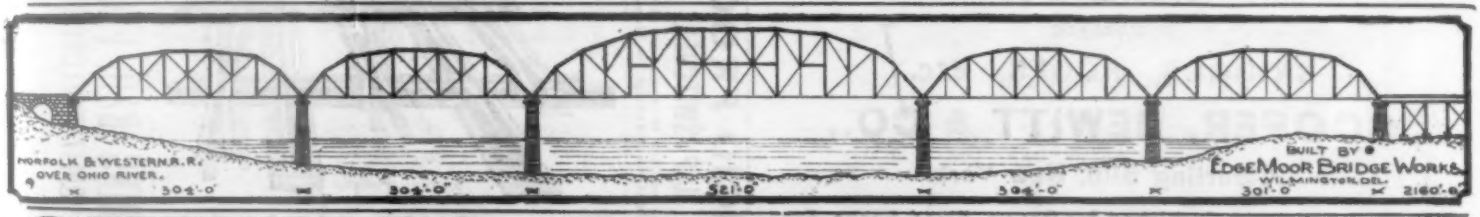

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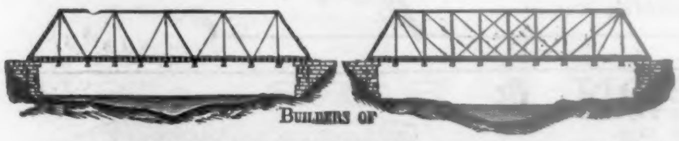

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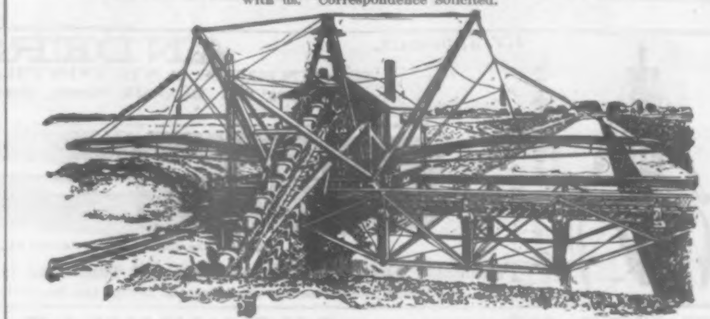

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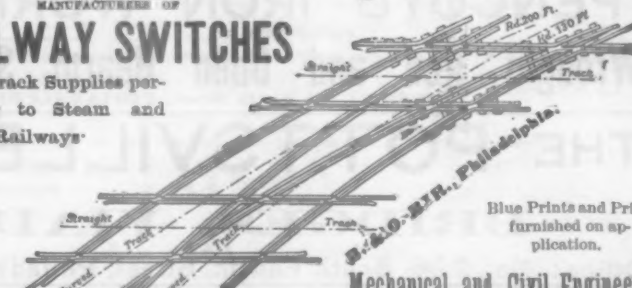

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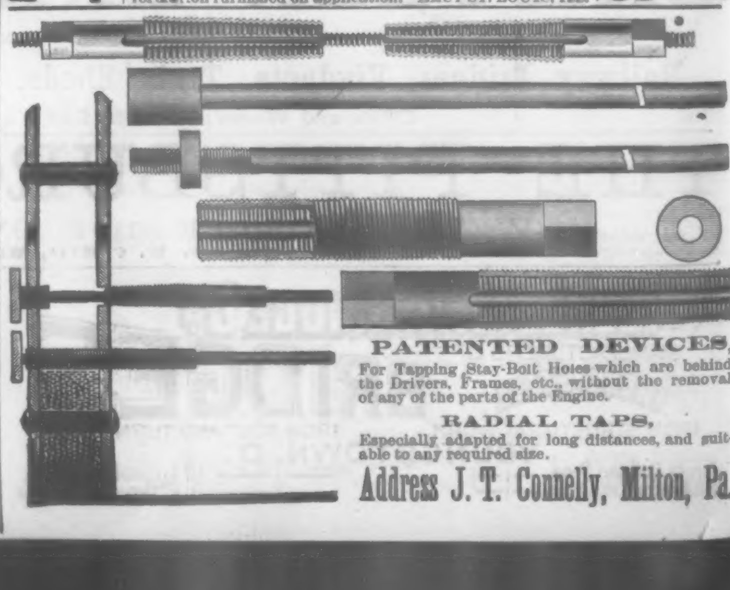

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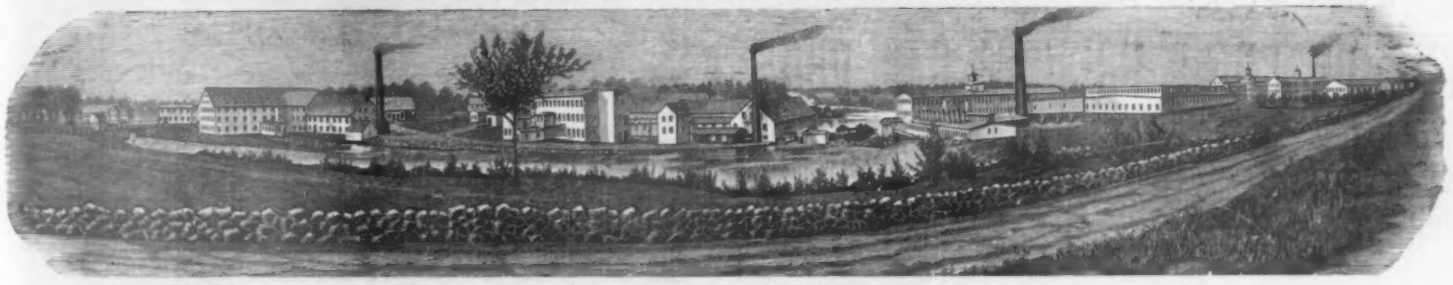

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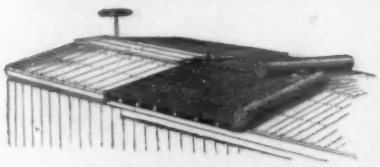
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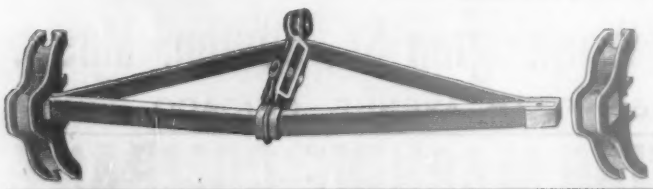
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